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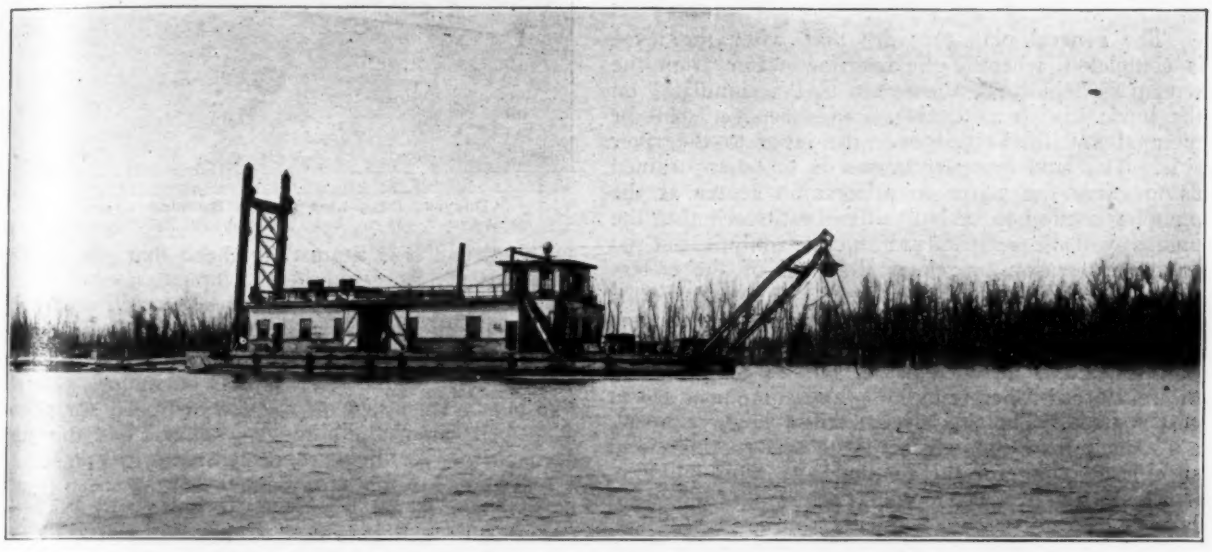


Electrically Operated Hydraulic Dredge in Levee Construction Near Fort Madison, Iowa.

Levee Construction and Electric Pumping for a Reclamation Project

Interesting Features of Work Now Going On for Drainage District at Fort Madison, Iowa—Electrically Operated Hydraulic Dredge and Electric Drainage Pumping Station

ORDERS have been placed for most of the electrical equipment and pumps required in the flood-water reclamation project being carried through by the Green Bay Levee and Drainage District No. 2, in the vicinity of Fort Madison, Iowa. The equipment to be installed consists of motors for operating pumps of a combined capacity of 90,000 gallons of water per minute, and the necessary transformers, wiring for power and lighting, and accessory motors and supplies.

The plan of this project is to reclaim about 13,000 acres of fertile land along the Mississippi River, which has always been in the nature of swamp land because of being subject to the overflow of that stream. Work on the project began in January, 1917, and is to be completed by September, 1918. It involves the building of 19 miles of levees, with a maximum base width of 200 feet, and a 6-foot top width, requiring the handling of 1,919,200 cubic yards of material; there are also being constructed 11 miles of main ditches and 12 miles of laterals. About 275 acres along the levee right of way had to be cleared of timber and brush. The height of the levee is 12 feet above the average water stage in the river.

DREDGING EQUIPMENT.

Two dredges are at work excavating for levee construction along that section of the course partly covered with water; and a drag-line excavator is in use building the levee along the part not submerged. Another kind of equipment used in levee construction is an electrically operated 20-inch suction dredge, belonging to the Northern Dredge & Dock Company, which takes up submerged gravel, sand and silt and discharges them along sections of the levee where the bucket dredge cannot operate advantageously. An illustration of this hydraulic dredge is given herewith. Its hull is 120 feet long, 40 feet wide and 10 feet in vertical section.

The equipment of this electric dredge consists of one main pump of that company's design, driven by an 1100-horsepower motor; two service pumps each operated by a 35-horsepower motor; two bilge pumps, each connected to a 15-horsepower motor; one air

compressor, driven by a 25-horsepower motor, and another one by a 10-horsepower motor; an electrically operated hoist, with which a 25-horsepower motor is connected. Power for the eight motors of a combined capacity of 1260 horsepower is supplied by the Mississippi River Power Company. The current is delivered at 13,000 volts to the dredge transformers, by which it is reduced to 2200 volts for motor use. The electrical equipment above described was furnished by the General Electric Company.

Pumping Station.

The general plan provides that, after the levee is completed, whereby the overflow water from the stream is held back, the water that accumulates on the land side, from drainage and seepage, shall be pumped and discharged over the levee to the river side. The land being reclaimed is to be so drained as to carry the water to a common center at the pumping station to be built. It is estimated that the pumps will be required to operate only about 90 days each season to relieve the land of the excess water.

The site selected for the pumping station is five miles upstream from Fort Madison. The construction of this plant is included in the general contract, and the reinforced-concrete building and equipment are to cost $65,000. The site is on overflow land, requiring a foundation of concrete set upon pile footings, and sheet-steel piling for the suction bay. This building, in which transformers, motors, main pumps and priming pumps are to be housed, will be three stories high, providing also office and residence quarters for those in charge of operations.

Pumps and Motors.

Two 42-inch, double-suction, single-stage, split-shell, centrifugal pumps have been purchased of the American Well Works, Aurora, Ill. Each pump is rated at a capacity of 45,000 gallons per minute, operating against a maximum head of 21 feet, with a guaranteed efficiency of 80 per cent. The suction head will vary as the water level in the ditches varies between elevations of 512 and 516 feet above sea level, and the discharge head will vary according to the level of water in the river. Low water in the stream at this point is at elevation 525, and high water at elevation 533. The average elevation is at about

Steam Dredge with 2.5-Yard Bucket Building Levee.

Bucyrus Drag-Line Dredge Building Levee.

526 feet, and it is against this head that the greatest efficiency will be required.

The two pumps are to be driven by two 300-horsepower, direct-connected motors, of 440 volts, 25 cycles, three phase, with full-load speed of 475 revolutions per minute. In the call for bids on motors, alternative bids were asked on motors, equipped for silent-chain-belt connections to the pumps, but the final decision was for direct-connected motors.

At the time this is written it has not been finally decided whether the motors are to be of the synchronous or induction type. The matter of awarding a contract for the motors involves the question of time of delivery.

Transformers and Other Electrical Equipment.

Three 200-kilovolt-ampere, step-down transformers, constituting a delta-connected bank, are to be installed at the pumping station. These are the oil-insulated, self-cooled type, with high-tension winding for 11,000 volts, and low-tension for 460 volts. One lightning arrester of the electrolytic type, suitable for 11,000 volts, three-phase, delta-connected circuit, with ungrounded neutral, is required. All transformers have been purchased from General Electric Company.

The switchboard requirements are as follows: Two panels for controlling the two pump motors, with one indicating wattmeter, one oil switch, two current transformers and other equipment; one panel to control two valve-operating motors, and motors for two sump pumps, one priming pump and for other station power and lighting; and a panel for controlling the incoming 11,000-volt line, the equipment of which includes one oil switch, indicating voltmeter, watt-hour meter, two current and two potential transformers. There is also a station lighting transformer and other auxiliary equipment.

The power wiring requires conduit and wire for the two main pump motors, these wires each to be 500,000-circular-mil size, rubber-covered, and new code double braid.

The main pump room is to be equipped with a 10-ton traveling crane, of 24-foot span, with traversing, hoisting and trolley gearing.

Hydroelectric Power Supply.

All electric power is to be supplied by the Mississippi River Power Company from its big hydroelectric plant at Keokuk. This company will provide light-

Motor-Operated Dredge as Used in the Northwest.

ning arrester equipment, and an outdoor receiving substation which will contain a Chicago type of steel tower with a triple-pole type L. G.-19 disconnecting switch. Its rating will be 40,000 volts, 50 amperes. Other accessories are to consist of fuses of the expulsion type, and hour-glass type choke-coils, and aluminum-cell electrolytic lightning arresters.

The project plans and specifications, including all phases of construction and installation, are those of the Edmund T. Perkins Engineering Company, Chicago and Quincy, Ill., and all work is being done under that company's engineering supervision, A. H. Beitman being engineer in charge.

The general contract is in the hands of R. H. and G. A. McWilliams, of Chicago and Memphis, and a subcontract for hydraulic dredging was let to the Northern Dredge & Dock Company, Duluth, Minn., which operates the 20-inch suction dredge, electrically equipped, illustrated herewith. The 2½-yard bucket dredge and the 1½-yard dredge with drag-line bucket, shown in illustrations, are operated by R. H. and G. A. McWilliams. These two dredges are steam-operated, the first named being a Bucyrus and the second a Marion. The levee construction, up to October 1, was 50 per cent done.

F. M. Kinzel is superintendent in charge of the work of R. H. and G. A. McWilliams; Charles Edwards is superintendent for the Northern Dredge & Dock Company.

HYDROELECTRIC POWER FOR MINING PLANT IN PERU.

Additional Facts Pertaining to Features of the Cerro de Pasco Mining Company's Plant.

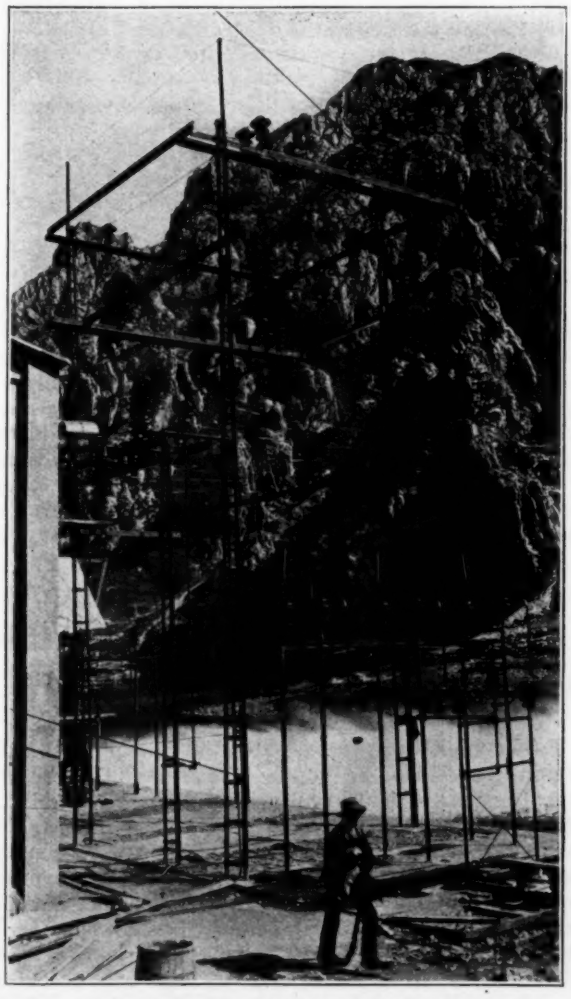
The ELECTRICAL REVIEW of September 29 contained an article on the hydroelectric plant of the Cerro de Pasco Mining Company, Cerro de Pasco, Peru, in which the principal features of this modern power station were described and illustrated. Included therein were data on the concrete dam, conduit, forebay and steel penstock. Interesting details relative to each of these features were given.

The main units, comprising three 3750-kilovolt-ampere, 60-cycle, 2300-volt, three-phase generators, each driven by two 2500-horsepower impulse water wheels, were described, together with all accessory equipment. A continuation of the article referred to, covering the subject of transformers, switchboard, transmission line and other facts, is herewith given.

In connection with the exciter sets, of interest is the fact that a 200-horsepower water wheel normally runs the exciter, the induction motor floating, as it were, on the line. Should anything happen to the water wheel the induction motor automatically picks up the load, so that the generators are always excited, thus positively maintaining current at the switchboard. One exciter set is more than sufficient to excite the three alternators, the second set being used entirely as a spare.

TRANSFORMERS AND SWITCHBOARD.

The transformer capacity consists of nine 1000-kilowatt water-cooled single-phase transformers, arranged in banks of three each. These step up the voltage from the generator pressure of 2300 volts to 55,000 volts for transmission. Between each generator and its transformer bank is located a switch chamber containing disconnecting switches, automatic and non-automatic circuit-breakers, potential and current transformers, etc. In these chambers the 2300-volt bus connections are also made. Outside of each transformer bank, in a separate room, are located two 55,000-volt oil switches, one set being automatic. Between these switches is located a 55,000-volt bus. The arrangement of the buses allows current from either generator to pass through either bank of transformers



Protective Equipment of Outgoing Lines.

and on to any circuit of transmission line from the high-tension bus.

The switchboard, being located in a gallery as above described, gives the operator a complete survey of the station. Master switches at the switchboard control all others in the plant.

Transmission Line.

Transmission of the energy is over three, three-phase lines, two of which serve the smelting plant at La Fundicion and the mines at Cerro de Pasco, Quishuaracancha and Goyllarisquisga, while the third reaches the Morococha mines. Substations are located at all of these terminals. The system is protected from lightning by ten sets of electrolytic lightning arresters, and a choke coil on each phase of all circuits placed just in front of each station.

In the construction of the transmission lines, 1400 Tripartite steel poles were used, together with 600 miles of No. 1 copper wire. The entire power system is also connected by a metallic-circuit telephone system, carried on separate poles from the transmission line.

All of the equipment was laid out with special consideration of the fact that this plant is located away up in the mountains, nearly 12,000 feet above sea level, where it is difficult to do complicated repair work and where skilled labor is not readily available except as it can be furnished by the mine shops. The selection of all the apparatus, and its design, workmanship and erection was so provided for by the Cerro de Pasco Mining Company as to get the best of its kind. The wisdom of this is demonstrated by the fact that the plant went into operation without any difficulties and has been operating steadily without any repairs.

It was designed and built under contract by F. G. Baum & Company, San Francisco, Cal., under the supervision of A. H. Wilcox as chief engineer. All of the principal equipment of the plant, including turbines, generators, exciters, etc., was furnished by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

In connection with this plant the Morococha Lakes, which are fed the year around by glaciers, have been converted into storage reservoirs by the construction of impounding dams, and it is at these lakes that the storm waters are conserved until the rains have passed and the seasonal snows have melted. Later on during the dry months this impounded water is released, thus increasing and holding the Yauli River's flow to the quantity required for power purposes at Oroya, so that there is no danger of any failure of the supply.

USE COAL ECONOMICALLY BY EFFICIENT EQUIPMENT AND INTELLIGENT FIRING.

Head of Bureau of Mines Shows National and International Importance of Conserving Fuel by Proper Use.

The high cost of coal and the difficulties of obtaining an adequate supply constitute at present a most acute problem in all power plants depending on coal for fuel. It is evident that during the coming winter coal will be used with much greater economy than ever. There are many of the smaller steam-electric plants, however, where the importance of more efficient equipment and more intelligent firing needs to be emphasized. The following remarks of a Government expert on coal and its use are therefore timely.

Talking to a representative gathering of men who are to assist the Fuel Administration in the different states, at their recent meeting in Washington, Van H. Manning, director of the United States Bureau of Mines, said concerning the necessity of urging the economical use of fuels:

"The economical use of fuel has proved to be no simple problem. The coal, the equipment, and the human variables make hard and fast general rules impossible. The Bureau of Mines has carried on extensive experiments to determine the fundamental principles of the combustion process and of furnace design, and, at the same time, has been making practical application of improved practice in Government power plants. Many publications are available which show the progress of the work along these lines.

"Americans have been as wasteful of coal as of other resources, largely because coal has been abundant. To many consumers it has seemed hardly worth while to give time and thought to the saving of coal.

"Conditions have suddenly changed. Today it is everybody's business to save coal. Coal is the foundation stone of industry. Without it the production of equipment for war must halt, transportation facilities must stand still. One man's careless and wasteful use may mean an idle factory or a cold house for his neighbor. With the world looking to us largely for its coal supply, with increased demands at home, with a scarcity of available labor, with overtaxed transportation facilities, the consumer of coal must pause and give serious consideration to the problem which confronts the country.

"If the consumers can be aroused to an intelligent consideration of the burning of coal, they can begin to save ten per cent of the annual production (600,000,000 tons) at once. With more effort, through instruction and a moderate remodeling of coal-burning equipment, which could all be accomplished during the war, a further considerable saving can be made. The possible coal saving when present practice is compared with the best ideal practice, is very large. If it were possible to supply the need of this country for light, heat and power through the highest type of mechanical devices, and if we could make a skilled coal user out of the average user, we could probably get along with half as much coal as we are now consuming. This ideal is far beyond present realization.

"The immediate problem is a difficult one. We cannot scrap all out-of-date power plants. We must start by doing the best with what we have. We must begin by saving coal at once. The problem is personal. It deals with the human element. We must reach the man with the shovel.

"About 15,000,000 people shovel the twenty per cent of our coal used for domestic purposes. Only about 250,000 firemen shovel the sixty-odd per cent of our coal used by power plants and railroads. While we must appeal to the householder to save coal, it is vastly more important to reach the fireman through whose hands the larger part of our coal passes.

"In carrying out a campaign to promote the saving of coal, let the appeal be made to the householder to cut down his consumption in every way possible, but above all, give serious consideration to methods by which a systematic relationship may be established between the office and the fireman. Encourage the manufacturer to take a keener interest in his fuel consumption and to back up his fireman by giving him the best information and equipment available."

Broadening of Electrical Contractors' Association Decided On

National Convention at New Orleans Heartily in Favor of Reorganizing as the National Association of Electrical Contractors and Dealers—Other Features of the Convention

A NEW era in the history of the electrical contracting business, which holds forth promise of establishing the contractor-dealer as a vital factor in the electrical industry, was insured by the adoption of a new constitution by the National Electrical Contractors' Association of the United States in its seventeenth annual convention at New Orleans, La., October 8 to 13. The association will henceforth be known as the National Association of Electrical Contractors and Dealers and will include not only a much more representative membership of contractors and dealers whose principal business is electrical, but also provides for an associate membership of persons, firms or corporations who sell electrical supplies at retail as a department or minor part of their business.

President Robley S. Stearnes,
Who Continues at the Head of the Association During Its Reorganization.

It is significant that, although many radical changes are embodied in the new constitution, it was adopted without a dissenting vote, indicating that there was a real need for an association properly organized to establish the contractor-dealer as a real factor in the electrical industry. Furthermore the vote was a splendid testimonial to the Committee on Revision of the Constitution, which was composed of J. R. Strong, W. L. Goodwin and Earnest McCleary.

But the dominating influence responsible for the unanimous approval and acceptance of the new propaganda was the untiring work of its sponsor, William L. Goodwin, of San Francisco, whose remarkable address on "The Ills of the Industry and Their Remedies," which summarized his observations during the past thirteen years, will go down in history, not in the electrical contracting business alone, but in the industry at large as the most comprehensive and constructive analysis ever made of an industry. When Mr. Goodwin concluded his address he was given an ovation accorded but few electrical men.

Objects of the Association.

That the new association will fill a long-felt want in the industry is very well indicated by a statement of its objects, which are as follows:

To promote the welfare of its members.

To distribute among them the fullest information obtainable in regard to all matters affecting the electrical contracting and retail electrical merchandising business.

To issue engineering and data sheets required in electrical engineering and electrical contracting problems.

To collect data relating to the business of electrical contracting and retail merchandising.

To aid in bringing about more friendly relations between electrical contractors and electrical retail dealers, and others engaged in the electrical industry.

To assist in marketing high-grade electrical material and apparatus of American manufacture.

To encourage its members in establishing and conducting attractive retail electrical stores.

To elevate the standard of electrical installations.

To co-operate with the National Fire Protection Association with a view to improving the quality of electrical material, as well as its installation.

To co-operate with the American Institute of Electrical Engineers in the solution of all electrical engineering problems, particularly the preparation of and compliance with standard specifications.

To co-operate with the American Institute of Architects in recommending standard and improved electrical specifications.

To co-operate with all wholesalers of electrical supplies in the study of distribution, standardizing of packages and catalog numbers and in reducing the expense of wholesale electrical merchandising.

To co-operate with the National Electric Light Association, its members and all other public service and municipal electric light and power companies in their endeavor to solve all problems tending to improve service to consumers.

To co-operate with the National Electrical Credit Association.

To collect and diffuse information affecting merchants, manufacturers, builders and others engaged in erecting buildings.

Features of the New Constitution.

The new constitution has been drawn up with exceptional care. Some of its features have already been indicated in the foregoing. The division of the National Association into the Atlantic, Central and Pacific Divisions is such so that the Central Division embraces the following states: Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, Mississippi, Nebraska, New Mexico, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, Wisconsin, Wyoming. All states east of this group are included in the Atlantic Division and all states west of the central group are included in the Pacific Division.

The Executive Committee is composed of 17 members, six of whom are elected by the Atlantic Division, six by the Central Division, two by the Pacific Division, and there are three members at large.

Members are defined as persons, firms or corporations engaged in the business of electrical contracting and repairing, including the installation of electrical apparatus and materials, or engaged in the retailing of electrical supplies, or in both contracting and retailing, it being understood that such electrical contracting and retailing must be their principal business. Associate members are defined as those persons, firms or corporations who sell electrical supplies at retail as a department or minor part of their business. For purposes of definition, the electrical contractor or dealer shall be any individual, firm or corporation carrying a general stock of electrical supplies and who may be prepared to make electrical installations. He shall have an established location where he transacts his business with the public and must have a sign or placard displayed announcing the character of his business and shall maintain the usual set of books and records necessary to the conduct of any ordinary business. He shall carry a stock of electrical supplies of not less than $250 for the performance of electrical installation work.

A section provides that the present constitution, officers and committees shall continue until the next annual meeting, or until the revised constitution and by-laws are put into effect. As soon as a sufficient number of states (not less than six each in the Atlantic and Central Divisions, and two in the Pacific Division) shall have accepted the new plan of organization and held Division meetings and elected their members of the National Executive Committee, the affairs of the present National Association will be turned over to the reorganized body.

The membership fee for members and associate members is $10. The annual dues of members and associate members shall be not less than $5 and not more than $250 in any one state. These dues are based on the amount of business done annually, this applying to gross sales in the electrical contracting and merchandising business. Where the total annual business is less than $12,000 the dues are $5. They increase in proportion to the increase of business, until when the gross amount of $500,000 is reached, the dues shall be $100; over $500,000 the dues are 1/40 of 1 per cent, but not to exceed $250.

The committee also submitted a proposed form of constitution and by-laws for each state association, in which it is distinctly stated that the latter body forms a part of a particular division of the National Association and all members shall be members of the National Association, and further all operations of the state association shall be in conformity with the constitution and by-laws of the National Association.

Reference to the chart on page 679 will convey an idea as to the organization proposed under the new constitution. The general plan is to divide the organization into three divisions: one to be known as the Atlantic Division; one as the Central Division, and one as the Pacific Division. Each state shall be considered a subdivision of one of the three territorial divisions. Each state association will be composed of a number of local organizations.

Report of Opening Session.

A brief report of the first day's sessions was published in our last issue. The convention was formally opened by President Robley S. Stearnes at 10 a. m. on Wednesday morning, October 10, although meetings of the Executive Committee and Board of Directors were held on Monday and Tuesday. A feature of the Tuesday meeting was a Round Table School of Instruction on Unit Labor Costs, held under the au-

Central Portion of Convention Group at New Orleans Meeting of National Electrical Contractors' Association.

spices of the Cost Data Committee of the National Association, assisted by a similar committee of the Ohio State Association.

At the opening session addresses were made by S. E. Doane, chief engineer, National Lamp Works, Cleveland, O., on "Electrical Manufacturers of America as Compared with Those of Foreign Countries"; by W. J. Clark, of the General Electric Company, on "A Comparison of Manufacturing Conditions Abroad and in This Country"; by S. A. Chase, of the Westinghouse Electric & Manufacturing Company, entitled, "The Electrical Dealer from the Manufacturer's Standpoint"; by J. N. Shreve, of the Electric Cable Company, New York, on "Contractors' Obligations in War Time," and by J. M. Wakeman, of the Society for Electrical Development, on "The Relations of the Society Toward the Contractor-Dealer."

Mr. Doane called attention to the highly developed state of the electrical industry of this country compared with that abroad and then dealt especially with problems that likely will confront the industry, due to foreign competition, at the close of the war. This competition he felt would be keener than ever experienced. He showed that in Europe much more economical use of materials is made than here. For instance, the thickest iron conduit required in England before the war was thinner than the thinnest allowed here. Fittings and supplies are smaller and lighter than here and yet quite safe. He stated that rust-protected iron is freely being used to displace brass and copper parts in electrical material.

Although great industrial problems confront this nation at present, even greater ones will come before and certainly after the war is over. Economy should require not only the saving of scrap, but also the prevention of useless waste of material when it is clearly shown that something less expensive will be just as good. Excessive weight, thickness or strength are superfluous. This is a matter not only of construction but frequently of specifications. Mr. Doane felt that the return of our young soldiers from Europe, bringing with them the ideas of economical construction, apparatus, etc., prevailing there, will have a very important effect upon the American industry.

Mr. Clark presented some very interesting statistics on electrical development in this country as compared with foreign countries. He spoke of the leadership of American manufacturers in maintaining research laboratories and engineering experiment stations which have been of great aid in furthering development. He referred to the mistakes which have been made in Europe largely in regard to policies. In this connection it was pointed out that an analysis of conditions revealed that there were over 27 different voltages employed in the transmission systems of Great Britain. Likewise in France, electric and steam railroads have constructed lines without reference to interconnection and, as a result, the different gauges of railroads have made it almost impossible to transport troops without a great deal of difficulty. Conditions are entirely different in Germany, he said, where all development has been made with a view to standardization.

In this country one of the most serious mistakes has been the failure to bring about a fuller development of our water powers. This mistake is being greatly emphasized at this time when there is a serious shortage of fuel and a correspondingly great demand for power. Mr. Clark also deprecated the policy, under existing conditions, of permitting waste of coal in the generation of electricity by insufficient power plants.

Business Sessions.

The address of Mr. Goodwin, which is abstracted at considerable length elsewhere in this issue, was presented on Thursday morning, following which there was a meeting at which the new constitution and by-laws were unanimously adopted.

The remaining sessions of the convention were taken up with discussions as how to proceed with the actual reorganization under the new constitution. It was decided that the first step was the appointment of the division chairmen, who are as follows: Atlantic Division, James R. Strong, of New York; Central Division, E. McCleary, of Detroit; Pacific Division, H. C. Reid, of San Francisco. Mr. Goodwin was appointed general chairman to have supervision over the entire work. The work of organization in the various states is to be undertaken by a committeeman

End of Convention Group at Annual N. E. C. A. Gathering.

Ladies and a Few Gallant Delegates in New Orleans Convention Group.

in each state. The appointees already decided on are as follows:

NEW STATE COMMITTEEMEN.

Alabama	J. R. Wilcox	Minnesota	W. I. Gray
Arkansas	C. G. Rush	Missouri	Fred Adam
California	M. D. Kohlway	Nebraska	James Corr
Connecticut	G. M. Chapman	New Jersey	Paul Jaehnig
Georgia	T. H. McKinney	New York	J. J. O'Leary
Illinois	J. N. Pierce	Ohio	F. C. Werk
Indiana	A. L. Swanson	Oregon	Mr. Tomlinson
Iowa	J. E. Sweeney	Pennsylvania	Albert Gentle
Kansas	R. M. Sutton	Tennessee	J. A. Fowler
Kentucky	C. C. Childers	Texas	W. M. Clower
Louisiana	C. S. Barnes	Virginia	E. G. Andrews
Massachusetts	A. T. Hixon	Wisconsin	G. F. Rohn
Michigan	J. J. Thorne	Washington	Mr. NePage

The present officers of the association are to remain in office until the reorganization is completed and their successors named. It was further agreed that the auditing and publication committees be dispensed with.

The permanent office of the secretary is to be moved from Utica, N. Y., to Chicago, Ill., on December 1, or as early thereafter as possible. It was also voted that the next convention be held in Cleveland, Ohio, during the month of July.

ENTERTAINMENT FEATURES.

The entertainment features of the convention were exceptionally well planned. Through the untiring efforts of President Stearnes and his lavish hospitality, combined with the efforts of the local entertainment committee, which fully bore out the reputation of southern hospitality, the convention delegates, the visitors and their ladies were very well taken care of. In the way of general entertainment for all in attendance there was a reception and dance in the Gold Room of the Hotel Grunewald on Wednesday evening. On Thursday evening the convention was the guest of the New Orleans Jovian League at a supper and entertainment at the Spanish Fort, and on Friday afternoon an automobile trip about the city brought all to the New Orleans Country Club, where the official picture of those in attendance was taken. This is reproduced in three sections in the accompanying illustrations. On Friday evening was given the annual banquet at which James R. Strong, past president of the association, was toastmaster. The feature of this evening was the presentation of the president's emblem by Earnest McCleary, past-president. On Saturday a special theater party was given.

Aside from these entertainments, special entertainment features were provided for the ladies during the convention sessions. These included a visit through the French quarter, "Vieux Carre" and the shopping district on Thursday morning, followed by luncheon. In the afternoon a special performance was given at the New Strand Theater. On Friday a special trip to "Bohemia" and a luncheon was provided.

Opening Meeting, Lynn Section, A. I. E. E.—The October 10 meeting marked the beginning of the seventh season of this Section, and not only did the attendance overtax the capacity of General Electric Hall, at Lynn, Mass., so that an overflow meeting was held, but the reports from the membership committee were most cheery. "The Bertillon Finger Print Science" was the theme of an illustrated lecture by Stacey R. Binckes, and was of intense interest. A debate followed on the subject: "Resolved, That It Requires More Skill to Design, Manufacture and Operate Meters than Turbines." The affirmative was sustained by Frank P. Cot, William H. Pratt, W. J. Lloyd and H. G. Hamann; the negative side being handled by Richard H. Rice, Dr. L. C. Loewenstein, A. K. Warren and K. M. Bradley. While the humorous side was not overlooked, much practical information was given. On the conclusion of the discussion a ballot of the house showed 320 favored the arguments of the turbine men to 254 for the meter side. The judges, D. B. Gauchet, J. F. DuBois and J. A. Dalzell, however, gave decision in favor of the affirmative, and chairman I. M. Davis called the debate a draw. The next meeting will be on October 24.

Lightning Protection for Gas and Oil Tanks.—R. L. Baker, electrical engineer of the Doherty organization, is working on an improved method to protect gas and oil tanks from being struck by lightning. This is one of the most prolific causes of explosions of such tanks.

The Ills in the Industry and Their Remedies

Splendid Address Before the Contractors' Convention—Broad-Minded Analysis of Evils and Their Solution Through the New National Association of Electrical Contractors and Dealers

By WM. L. GOODWIN

IN APPROACHING this whole question I want it to be understood that I have endeavored to confine my study and recommendation to basic principles, something which is not generally understood by the membership of this and other organizations.

Having to do with these basic principles, I want to add further that there is nothing original in what I am going to present to you today, except possibly this Wheatstone bridge principle of electrical merchandising. Everything else is the result of the collective thought, study and experience of the thoughtful men of the industry. My part has simply been to uncover these facts, tabulate them, and present them in understandable form.

William L. Goodwin.

We are dealing with facts, not theories. One of the fundamental ills of our industry has been the lack of inclination or courage on the part of the men of our industry to go before groups of men in these various organizations and state facts and truths. Much time has been consumed in idle talk for advertising purposes only.

This whole plan which I am going to present is not a theory. It is a fact, and is in practical operation in some sections of the country. It has proven its value and merit after more than four years' experience. So we are going to deal, in this whole question, with facts and not theories. Furthermore, everything that I have to say must be considered as recommendations. That is as far as anyone can go. Action depends upon the conviction on the part of each individual, each institution, each group and each organization, as to the logic and practicability of the recommendations, and the decision and the result rests with them.

There has been much discussion and I know the question has been asked many times, What is this so-called Goodwin Plan?

The Goodwin Plan.

It is a campaign of education now under way, conducted principally through trade papers, organizations and other channels, to co-ordinate the various interests in the electrical industries. Or, to put it in another way, to bring together in harmonious action, the various interests in the industry, so that there may be established retail distribution of electrical materials, at fair prices to the consumer, and a fair profit to all parties taking part in the transaction. That each individual owes a responsibility to the organization representing his branch of the industry, and that the organization owes a similar responsibility to its members; that each organization, representing each branch of the industry owes a responsibility to all other organizations in the industry, to the end that all problems may be discussed, having in view the interest of all, thereby providing a basic plan for more adequately and efficiently serving the American public, and resulting in an extension of the activities of our industry to the great undeveloped field before us.

That, gentlemen, is the so-called Goodwin Plan, and nothing more.

I want to also remind you that the questions to be considered are only confined to commercial problems. All questions affecting technical or engineering problems should properly be discussed before organizations representing that branch of the industry.

Importance of Good Leadership and Consideration of Basic Causes.

Probably the greatest ill of our industry today, is the lack of appreciation of the importance of selecting the right leaders, and, having selected the right leaders. to stand behind them, no matter whether you temporarily believe they are right or wrong. Men hesitate to participate in the discussions of this and other organizations because of the personal criticism that is cast upon them. I have had the pleasure of enjoying a great deal of that sort of criticism and, were I to take it seriously, any effort that I may now be putting forth to bring together the various elements in our industry, would have ceased.

To get down to the real question of the ills of our industry we must constantly have in mind that in order to provide a remedy we must first determine the cause. Most of our effort in the past has been to solve the problems before us without any consideration of the basic cause of the trouble. It is useless to discuss, for instance, the question of organization, the question of merchandising, and to criticise the methods proposed, unless those criticising are in possession of basic facts—and what I mean by basic facts are questions that have never been discussed in our various trade organizations.

I spent a great deal of time recently in a meeting of electrical jobbers, and there I found that the discussion was along the lines of internal investigations of cost of packages and distribution; that much time and money was being spent in the solution of that question, whereas, as a matter of fact, it occurred to me immediately that the basic cause was from without, and the men of that industry have been discussing that problem for probably ten years, and even now have not realized that the basic cause is outside of their own field.

Another ill of the industry has been the attempt on the part of existing organizations to solve these many problems by treatment only within their own organizations. It is impossible, in an industry such as ours, made up of at least four commercial factors, to solve any of the more important problems, except first by discussion within each organization and conclusion as to basic facts, and then, by co-ordination, bringing the other organizations together to discuss the problem jointly by all interested. Until that one principle is recognized the solution is not here. The activities of existing organizations representing the various groups, have been, to a large extent, without regard to the interests of others.

Having been a member of electrical jobbers' associations for many years, and having participated in all of their discussions and having missed only one meeting in seventeen years, I am in a position to tell you that they, to my positive knowledge, have never approached this broad question with relation to all other organizations.

Furthermore, individuals have likewise attempted to solve these many problems, and in their attempts practices have been instigated that have resulted to their own detriment. No individual, be he ever so large, or ever so small, can, by single, individual effort, solve our problems. It is impossible.

It has been almost impossible to treat with basic causes, on account of this great lack of proper organization. I started many years ago to gather statistics of all kinds, which led me into gathering information on the various electrical contractor-dealer organizations of this country. I selected seven out of all existing organizations, to point out to you that those seven organizations are operating on seven distinct plans. Where can you get, under such conditions?

While I do not claim that conditions on the Pacific Coast are 100 per cent—and they never will be—I want to point out that nevertheless there is one section of the country, at least, where the various contractor-dealer organizations are operating under a uniform plan, permitting the creation of an advisory board of the various Coast associations, which came into existence only a very short time ago, and for the first time they are able to discuss fundamental questions of interest to all, because they are operating under a uniform plan.

I also want to point out that this question of organization is not a new one. During the convention of the National Electrical Contractors' Association held in San Francisco in 1915, I made a recommendation to the members of that convention that I am going to read to you, to see how far it varies from the problem before you today.

"I would suggest to the members of the National Association that they encourage, first, the formation of local associations, consolidated into state associations, which may be one or more in each state, and through a per capita tax of the state association, draw their membership into the National Association. Through such a plan there can be added to the membership of the National Association, in a very short time, 5000 or more new members. I believe California can deliver to the National Association, under such a plan, in the neighborhood of 300 new members. I would suggest that at this meeting you consider the advisability of the appointment of such committees as may be necessary to provide amendments to your by-laws and provide for this condition. With such a good, strong state association in California, representation in the National Association is far below what it should be. Every member of the state association should be a member of the National Association, and I believe this condition will prevail in the very near future." Only two years ago—a very short time after all—and we are facing that very question today.

Another great ill that I hope will soon be cast aside is the form of your present National Contractors' Association. The nature of your association does not permit of the treatment of the problem before you to such a degree that you may be able to attract the great numbers of men in the contractor-dealer branch of the industry. This is evidenced by the fact that in the many years that this organization has been operated, you have now a membership of approximately twelve hundred. That suggests a fundamental fault right there. This is not with the idea of criticising the men who have worked so honestly and faithfully in behalf of the interests of the organization, but it is simply an evidence of the many difficulties we have had in struggling with our problems, because it is also evident in all other organizations.

Therefore, in approaching the question of organization, it was immaterial to me how the various clauses of the constitution were set in order, or what the objects of the organization were to be; but to provide a basic plan of organization that would take care of present and future requirements.

Proposed Plan of Organization.

This plan of organization shown upon the chart here presented, may leave the impression that it is too elaborate. But you must remember this one point, and if you ever lose sight of it you will lose sight of the fundamental reason for your present small membership, that of the great number of electrical contractors and dealers in this country, the large majority will never be able to attend any but the single meeting held in the lower group. That is as far as they will be able to go. Financial and other conditions will not permit of their even traveling to the district meeting, nor to the state meeting, nor to the division or national meetings, and if you cannot provide a plan which will permit of an organization where all matters discussed above may be passed upon and presented for discussion below, you cannot interest the

thousands of concerns in this business. So the idea that I have had in mind at all times was to provide a simple organization within the reach of all and, at the same time, provide a connecting link where the bigger problems discussed above in the larger organization could be passed upon by the smaller organization. Less than 10 per cent of the membership of this proposed organization will ever get to a national meeting, no matter where it is held.

Another fault in your present form of organization, due to the smallness of the membership, is the lack of adequate funds to conduct the proper propaganda before you. Lack of funds results in a lack of a proper and efficient staff. This work cannot be carried on except at great expense.

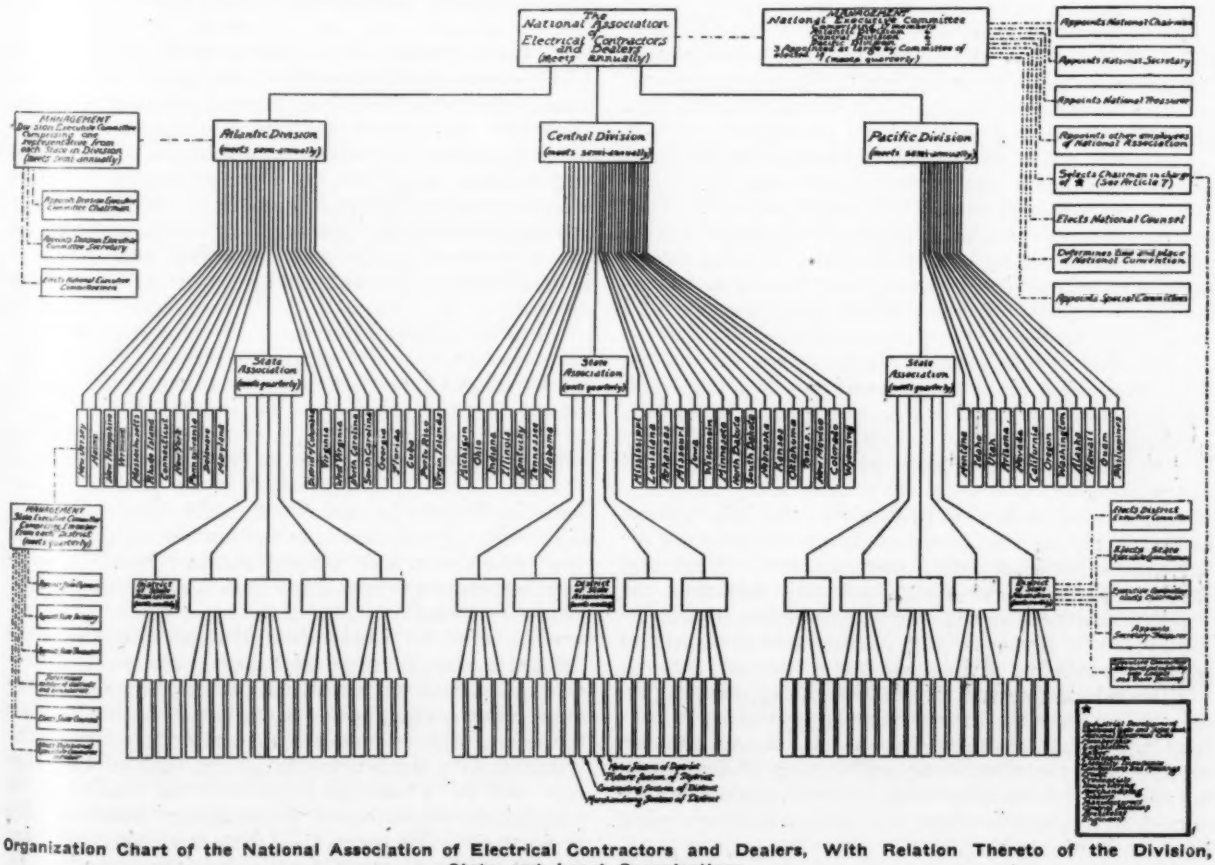
I believe that, fundamentally, it will be necessary for this organization to develop an income of at least $250,000 per annum, to properly treat with the problem before the contractor-dealer. In order to do that, for your own self-interest, you must have the financial support of every concern in the industry so far as it may be possible for you to enlist their support. You need that money to provide the staff, and the staff is necessary to carry out the plan which I have proposed. The present officers of your National Association are handicapped principally from lack of finances.

There are other associations that might be listed as a part of the ills of the industry. As I view it, the National Electric Light Association, the Electrical Supply Jobbers' Association and the so-called Associations of Manufacturers, which are only in their infancy, have in the past and are now attempting to solve these problems in the same way that the contractors have attempted to solve theirs, and I hope that representatives of their various organizations who may be present will eventually be able to bring their organizations to the point where they also will realize their own deficiencies, broaden out, and prepare to discuss these problems with other organizations. These other organizations suffer in membership as does the National Electrical Contractors' Association.

The Electrical Supply Jobbers' Association, to my mind, while a good constructive association, is not representative in a true sense of the wholesalers of this country. They must open their doors and enlist, so far as possible, every concern engaged in the wholesale electrical business, without regard to its policies, practices or the particular material it may be handling.

The manufacturers, to my mind, suffer from the need of proper organization. Only recently there has been formed what is known as the "Associated Manufacturers of Electrical Supplies," and that organization will undoubtedly do much to correct the many ills that the manufacturer struggles with, such as standardization, packing methods, accounting methods, and the many other problems, including research, which the manufacturer has to deal with. But the manufacturers, who are possessed of great resources, and greater latitude, and in many cases great ability to cope with these problems have not, for some reason or other, brought their own branch of the industry together, and there is a great need for a national association of electrical manufacturers, without regard to whether they manufacture electrical apparatus or electrical supplies.

Another ill in our industry is the lack of definite, known sales policies on the part of the manufacturer, the wholesaler and the retailer. I challenge any man here present to get up and clearly outline the sales



Organization Chart of the National Association of Electrical Contractors and Dealers, With Relation Thereto of the Division, State and Local Organizations.

policy of any five manufacturers in the United States. That condition, that lack of a definite policy on the part of the manufacturer, results in many misunderstandings, with consequent demoralization, wasted energy and troubles to both parties. I recommend that each company summarize its own problems, define its policy and make public announcement so that we will know where each and every one stands, and we will then be in a position to make an intelligent decision as to the concerns we care to deal with and the products that we care to handle. Such well defined policies are in common practice in almost every industry except the electrical industry.

Retail Distribution and Scientific Merchandising.

Another great ill in our industry is the lack of retail distribution. The basic causes leading up to a lack of retail distribution are many. Immediately they are understood and solved, retail distribution will develop at a very rapid rate.

And this one question of lack of retail distribution suggests that I point out what I claim to be a scientific method of electrical merchandising according to the Wheatstone bridge principle. I struggled with this question for more than seven years. I simply mention that in passing to impress upon you the fact that I have not jumped at conclusions, that I have given due consideration to all of these problems, obtaining opinions from many men in the industry, discussing these questions freely and arriving at my conclusions.

We have in the electrical industry a condition to deal with that is probably more serious than any other single item in that the success of our whole industry depends upon proper merchandising methods. Electrical merchandising, at this time and in the past, has been in the control of men trained along technical and engineering lines—a profession which we are proud to recognize. But, on the other hand, I claim that scientific electrical merchandising is just as much a profession as electrical engineering. But to get men of an engineering trend of mind to appreciate that fact is our real difficulty because the master mind on engineering problems believes that he possesses a master mind on merchandising problems. Existing conditions should convince anyone that this is a fundamental error. What we need in this industry, and particularly in the larger companies, whether they be manufacturing, wholesaling, or central-station institutions, are men trained along merchandising lines, and that all questions pertaining to merchandising shall be handled by men of that special training, rather than left to the will of engineers who do not understand the problem.

So I worked on this principle of the Wheatstone bridge, believing that every engineer understands the basic principle of electrical measurement. We found that the Wheatstone bridge not only supplied the fundamental necessary to the development of our industry, but it supplies every fundamental necessary to the merchandising division of our business.

The whole question of merchandising, simply put, means that we must have a balance. We have to contend with manufacturer, central station, wholesaler, retailer and the consuming public, and if we cannot keep all five interests in balance, then our time is consumed in lost motion, due to friction and wrangling between the branches.

I think you will all agree that at the present time the galvanometer is away off balance. It is off balance because of improper policies on the part of each branch of the industry. Starting with the public, which is the basic cause of our existence, we must first consider its interests. If we do not, we are going to be hampered by improper legislation, restraints and restrictions, that will compel us to get back into balance.

Starting with the public, the first point of contact is with the financial interests. From the public our money concentrates in these financial centers, in the form of capital, and it is from that class, either represented through banks, trust companies or other institutions, or the public direct, that we must draw our capital to the industry. So long as the bridge is in balance and the public are satisfied, and returns are justified, money will flow, and as it flows the first point of contact is with the manufacturer.

Without the manufacturer's product we would not have the industry. The manufacturer, therefore, will take off his requirements of capital for manufacturing development. The capital next passes to the central station, because without the energy, the other two branches could not progress. So the central station must next take off its share of the capital. Next come the wholesaler and retailer, the two factors which have to do with distribution. So that all factors must constantly remain in balance—otherwise the line is broken.

After we have provided capital, and manufacturers, central stations, wholesalers and retailers have been created, then we start on our journey of merchandising. I claim that each interest involved should be recognized as possessing the right to sell its product to whomever it pleases, whether it be wholesaler, central station, retailer, or even to the public direct, and we should never commit any act or discuss any point that tends to prevent any interest from so doing. The moment we do we throw the bridge out of balance, because that is a fundamental privilege extended under the laws of our country, which permit any concern to conduct its business as it pleases. The minute you attempt to prevent, by word of mouth or otherwise, any manufacturer, wholesaler, central station or any one else from transacting their business in the way that they have concluded is best for them, difficulty is encountered and the bridge goes out of balance again.

But in preparing the bridge, I have very carefully placed the manufacturer, the central station, the wholesaler and retailer at the extreme points of the bridge to clearly indicate that in the distribution of product from manufacturer to consumer it is not necessary for merchandise to pass through any fixed channel. It is not necessary for the product of the manufacturer to be sold through the wholesaler. Nor is it necessary for the manufacturer to sell generating apparatus through the central station. Nor is it necessary for either of these three branches to transact their business through the retailer.

The idea is simply this: that all interests must recognize the interests of others; that in merchandise passing from manufacturer to consumer, you must make contact with the various branches. When the manufacturer proceeds to reach the consumer he is faced with the wholesaler in the path of his progress, and he is likewise faced with the retailer in the path of his progress, and if his plan of merchandising is fundamentally correct, he has made due provision for all points of contact and no friction results. If,

for instance, you attempted to force the flow of material through these various channels, what would happen? Mr. Manufacturer, in his endeavor to reach the public, may find himself blocked by the wholesaler, who would simply decline to market his product in the way that Mr. Manufacturer demanded, and the manufacturer would have to go out of business, if such a condition were possible. We can never advocate any such insane idea in electrical merchandising.

But if the wholesaler is entitled to a place in the process of distribution, he will remain there so long as he is an economic factor, and so long as he is such it is desirable for the manufacturer utilizing that means of distribution to bear in mind that he makes contact with the wholesaler, even though he sells his product direct to the consumer, and if he bears that in mind he has provided a differential in his selling discounts, which, summed up, simply means that business will not be placed in the hands of either wholesaler or retailer, without the services that must be rendered; that Mr. Wholesaler and Mr. Retailer can earn a compensation if they render service, but if they sit idly by in their offices, Mr. Manufacturer or Mr. Wholesaler will be compelled to go direct to the consumer in order to get an outlet for his product.

Importance of Advertising and Publicity.

A member of this association, being asked whether or not he advertised, answer, "No, I have not spent a nickel in advertising in ten years." Would you care to oblige Mr. Manufacturer or Mr. Wholesaler to drive his product through a retailer who has not spent a nickel in advertising in ten years? We cannot keep such institutions or such people alive in the electrical industry. They must provide their own means of livelihood. We cannot establish any false barriers in the system of distribution.

Lack of known practices and principles produces another ill. We are suffering both from a lack of advertising policies and a lack of advertising, both in trade magazines and popular magazines. Hundreds of thousands of dollars have been wasted in our industry by poorly prepared copy. If you are going to advertise—and you should advertise in some form or another—get the counsel and advice of men who understand advertising. You are preaching the gospel that if you want electrical work performed go to an electrical contractor. Then be consistent—if you want advertising go to an advertising man, because the greatest danger that we face is a poorly prepared "ad" and an improperly stated fact. In advertising you are dealing with the public. It is a means of passing the message from one to another. If you are going to indulge in it at all, get the experience of men who understand it.

Another ill: The tendency to discuss these questions within the confines of the various organizations behind closed doors. If there ever was an error in organized effort, it has been that fundamental error in almost every form of American commercial organization. If our government really wants to provide constructive legislation, then let us propose a bill that no commercial meeting shall ever be held unless it is open to the public. And I mean by the public, representatives of the press, of course.

Lack of Financing and Other Ills.

Another great ill in our industry is the lack of a proper source for capital requirements. We have not in this country, so far as I know, financial institutions who have made a study of this branch of the electrical industry, and are in a position to provide our capital requirements. In many other industries development is taken care of by surplus profits. But the electrical industry is going ahead at such a rapid rate that the accumulative profits, if devoted entirely to new capital requirements, would not represent more than 20 per cent of our needs. Collectively we must provide an institution or institutions to take care of these capital requirements. This association should make a careful study and should provide a budget of the capital requirements of the membership of the organization, and should lend its effort to supplying that capital to its membership. Other organizations should make a similar study and then, collectively, we should get together and, possibly, utilize the surplus of capital provided for any one branch of the industry in the others.

Another ill of the industry has been our tendency to mold public opinion in an unfavorable way, with ultimate detriment to the industry. How many electrical contractors, electrical wholesalers and artisans in our industry have said a kindly word for the public utility company in their community? Until a very short time ago, and possibly in some sections even at this time, the principal selling argument of the electrical contractor was to tell his trade of the miserable personnel and policy of the central station in his community.

Another ill of our industry is the lack of statistics—federal, state and local. There are practically no statistics compiled by our Government on the electrical industry in a broad sense. We have statistics on the central-station branch of the industry and other statistics, probably of equal importance, but when it comes to statistics on the problems of electrical contracting and dealing, you can get nowhere. We should immediately start out to gather these statistics that are so necessary. If the electrical manufacturers of this country could refer to statistics and there was presented to them the purchasing power of the electrical contractors and dealers of this country, you would at once command their recognition. They do not realize your importance and you have very carefully, but foolishly, neglected to tell them so.

Another ill of the industry is the ignorance of the personnel as to just what is trying to be accomplished. All you need to do to confirm that fact is to discuss with a representative of any of the larger companies or any of the smaller companies, five, six or seven fundamental questions about his problem. What is he trying to accomplish? I believe that we must answer the selling arguments of salesmen by the counter argument: I want to know, first, your selling policy; second, the quality of your product; third, the selling terms; and last and least of importance, the price. When that argument is put up to the average salesman you will find that he hasn't anything to say.

One of the fundamental errors made by electrical contractors is their almost insane desire to purchase on price. Did any one ever hear of an electrical contractor purchasing anything without first qualifying, "What is your price?" That is the business of buying. Fundamentally it is wrong. When you buy, you buy with an object in mind, and that object is to sell; and the object in selling is to produce a profit, and that is what you are interested in. It is often said that a good buy is a good sell. Let us reverse it—a good sale is a good buy. Profit never results until the sale is completed. Be more considerate when you

purchase of the possibility of selling at a profit, and be less concerned with the price at which you buy. When Mr. Salesman waits upon you and offers to sell you a product, give him this question and see whether he is going to sell or not: "How am I going to sell your commodity and what profit am I assured—reasonably assured—when I sell it?" A man or a concern who sells you on price, and price only, has no consideration for your interests. What we want in the electrical industry is constructive selling with the fundamental idea that the transaction from manufacturer or wholesaler to contractor does not complete the sale. The sale is not completed until the product is in the hands of the public; you have received your money, taken care of your overhead and have something left for a profit.

Encroaching on the Functions of Others.

Another fundamental error is the tendency of manufacturers and wholesalers and others to indulge in functions that could more economically be taken care of by others. I believe that if a careful study were made, it would be shown there are very few wholesalers in the country today who are conducting a retail department at a profit. They apply the principles of wholesaling to the business of retailing. The expenses of retailing are charged to wholesaling, and vice versa. As a result of that condition, wholesalers are demanding from manufacturers margins far in excess of those they require to economically distribute the product of the manufacturer. I mean by that it is unfair to present to a manufacturer figures which show that your overhead is 17 per cent and that you must have a compensation above that figure before you will be interested in marketing his product, when, as a matter of fact, your proper rate of per cent should be 12, but it has been elevated to 17 because you have a retail department. If a wholesaler is going to retail, then let him segregate his business, just as he would segregate wholesaling and contracting: charge to retailing the proper items; and I want to tell you that no wholesaler in these United States today can indulge in retail electrical merchandising at any 17 per cent overhead. But because he has consolidated wholesaling and retailing, he only obliges the manufacturer to concede him a discount equivalent to his overhead for wholesaling, plus a fair rate of profit, and in reality he retards the retailer who has an overhead of probably more than 25 per cent.

Another ill of the industry is the lack of uniform catalog numbers, standard packages and packing methods. It is a great joy for a manufacturer to put out a standard line of goods and, with the narrowness that is usually displayed, attach his own private catalog number; and so we have in the electrical industry today probably ten articles that could not be told apart by experts and they have ten catalog numbers! Why, nobody seems to know. We have the same article put out by different manufacturers with varying standard package quantities, and so you must be an expert on catalog numbers and catalog quantities in order to buy the way you want to buy. Today you order a 100 of a certain article and you get the standard package, and you go back and order a 100 of the same article from some other manufacturer and you find that his standard package is 250. Investigate any other industry, if you will, and compare the packing methods employed by other manufacturers with those used by electrical manufacturers.

We want the product packed in such a way that it will pass from manufacturer through the various branches to the retailer, and he will be enabled to place it upon his shelf, properly displayed and not be obliged to rewrap when sent on to the consumer.

Another ill of our industry, and probably one of the most important of all, is the tendency of certain branches of our industry to engage in certain operations without profit. To be more specific, I mean that they engage in merchandising at less than the purchasing cost without regard to the overhead or profit, and then tack the loss onto another unknown, unvalued commodity, resulting in misunderstandings, friction and trouble, and eventually destructive regulation and legislation to the individuals participating in such practices.

Another ill of the industry is the tendency on the part of contractors and retailers to complain that business doesn't come to them. Many contractors and dealers in the electrical industry seem to believe that they occupy a position in the industry by necessity. The electrical contractor must justify his position in the electrical industry or he will soon find himself relegated to the scrap heap. You must render a service, you must create something, you must aggressively go after business or your permanency is not assured.

Absurdity of Selling at a Cheap Price.

Another ill of the industry, and one that is not appreciated by electrical people, is that there exists a belief on the part of the contractor, wholesaler, manufacturer and central-station interests that it is impossible to sell our commodity unless we offer it at a cheap price. And so the price of the electrical commodity has been lowered to such an extent that we haven't even left provision for actual overhead expense and the various interests participating are unable to maintain their own institutions. I mean that it was the belief, which still obtains in many directions, that we would never interest the electrical public in household devices unless we could get the price of an electrical flatiron down to about $1.50. The result was no profit for wholesalers or retailers, a lack of desire on the part of the wholesaler or retailer to put any sales effort behind the commodity, resulting in the necessity of the central-station branch of the industry marketing this product, because of the desire to fill their lines with kilowatts. Only recently we have found that due to increases in cost of raw material, labor and other causes it has been necessary to increase the prices of all commodities. It has not retarded the sale of anything. We must never get the price so low that we will be obliged to reduce or remove the margins to those participating in the sale. The public will purchase our commodity when it is properly presented to them, and the question of price, whether it be $3.50 or $3.60, for an electrical flatiron after all is immaterial. We must appreciate the fundamental principle of selling and let the question of price take care of itself. This tendency extends to the contractors in an acute form.

What does the electrical contractor do? He gets the plans and specifications from the architect and not in one case out of a thousand does he ever suggest an addition. But he immediately points out to Mr. Architect how much he can cut out of the job and save money. Your idea of merchandising is to give a man less than he actually wants and needs, and so our country is just littered with buildings of all kinds, in which it is almost impossible to connect an incandescent lamp, let alone a portable or an accessory of

any kind, and in almost every case their elimination has been through the suggestion of the electrical contractor. The contractor should never bid on a job of any kind without offering some kind of a suggestion that it ought to be a little better or that something ought to be added. That is merchandising.

Another ill of the industry is the high percentage of labor cost in contracting work and also the highly competitive nature of the business. Until you, as electrical contractors, solve that problem, you never will progress. You must develop your business so that at least 75 per cent of it will be non-competitive, and if you are strictly an electrical contractor, depending upon building operations, you never can get into that class. You must attach to your contracts some sort of a maintenance clause so that once an installation is performed the customer will be a client of yours forever. When you make installations, industrial and otherwise, you should provide maintenance contracts so that the electrician of the future in the industrial plant will be an employee of the electrical contractor.

Another ill of the industry is a lack of information on all kinds of electrical merchandising, storekeeping and electrical contracting. I have been in almost every book store in this country looking for a book on electrical contracting and I am still looking for it. I hope some day that, if we cannot individually, we can collectively prepare a book on electrical contracting.

We are blessed in our industry with what we call the National Electrical Code, and there is no one here will deny that it has elevated the standard of the electrical business. What would happen if that Code were removed no one dares predict, but we lack something even more important than the National Electrical Code. If you can appreciate the importance of the National Electrical Code, can you appreciate what it would mean to you to have a code of ethics, or a code of principles, that would be just as clearly understood by all as is the National Electrical Code, and that there was the same desire on the part of all to follow that code of ethics?

Lack of Cost Knowledge and Accounting Methods.

Lack of knowledge of costs has been talked of so often and has been written of in the papers so much, but even so, as important as it is, it is not understood. Do not guess at your overhead. If you don't know, go out and hire an expert accountant to come in and tell you, and if you cannot afford the services of an expert accountant, go to any jobber in the community and ask for the services of his head bookkeeper or credit man, and he will gladly come into your office and take off a statement and tell you what your overhead is. And then, after you know, remember that every operation must provide for the cost of material, labor, overhead and profit.

Another great ill in our industry is the lack of standard accounting practices. The electrical manufacturers, the electrical wholesalers and the electrical retailers as groups should operate under uniform accounting methods because it is impossible to determine defects and losses except by comparison, and it is impossible to make comparisons today because each individual and concern has devised his or its own accounting method. We should have forms of accounting for electrical contractors, based on the volume of the respective businesses, but whether the business be one of $1,000,000 a year or one of only $10,000 a year the accounting systems should be so standardized that comparisons could readily be made.

Edwin N. Hurley, former chairman of the Federal Trade Commission, gathered certain statistics governing American business. And what were the facts developed as the result of that investigation? That there are over 60,000 successful firms in the United States, and that only half of them charged off anything for depreciation; that of 260,000 firms in business in the United States, only 10 per cent know the cost of handling and selling their products; 40 per cent estimate their costs, and 50 per cent guess, basing their figures on those of their competitors. All you have to do to prove that is to take a given commodity with a known cost and cut your price in two and offer it for sale and see how quickly some of your competitors will follow you. They have such confidence in the costs determined by some that they follow the lead, regardless of what that lead may be.

Miscellaneous Evils.

Preparation of specifications on the part of electrical contractors is another ill in the industry that must be remedied. That is a function that properly belongs to the consulting electrical engineer, and so long as you perform the function of another you may expect retaliation, and you are certainly meeting with it from many directions today.

The question of compensation for labor charges in overtime work results in many disputes between the owner and the contractor. They should be clearly defined and provided for in your initial contract so that overtime and extra work will not be a question of bargaining when the day of settlement arrives.

Another ill is the lack of proper legislation. If there is any industry in this country that should be regulated by state license it is that of the electrical contractor. We are suffering from lack of legislation and licensing because in the past the contractors have attempted to have inaugurated various rules or adopted various laws for the purpose of fencing in the industry, as it were, advocating high licenses and other means of restraint. What we want in every state in this country is a license law that provides for an examination by a competent body, even though the license fee may be as low as $1. We should proceed immediately along an educational propaganda with that idea in mind. Let us encourage legislation to that extent but make the fee nominal.

Lack of standard contract forms is, indeed, an evil that too often comes home to the electrical contractor. I know of cases where electrical contractors have submitted bids on specifications when they were not permitted to retain the specifications or the plans until the bids were opened, when it was found that other pages and other clauses had been injected into the plans and specifications and they have signed their contract without checking back and have been obliged to perform work that was never figured in the initial contract. We need standard forms of contracts that will protect the electrical contractors as well as the owner. Read any of the existing forms in current use and they are all designed to protect the owner without regard to the interest of the contractor.

I have not attempted to enumerate all the ills of our industry but I think I have mentioned a sufficient number to produce the desired effect—that of causing you to return to your homes and giving this serious question the thought and study that it deserves.

The Force of Repulsion in Disconnecting Switches

Derivation of Fairly Simple Formulas for Calculating the Force Tending to Open Disconnecting Switches—Curves for Instant Determination of Opening Force

By H. B. DWIGHT

A FREQUENT phenomenon caused by short circuits on heavy power lines is the forcible opening of disconnecting switches by the repulsion of the currents flowing in them. Where the force of repulsion is expected to be large, the switches must be provided with locks or latches for holding them closed. In this article there is derived an approximate formula for estimating the magnitude of this force in usual types of disconnecting switches.

In Figs. 1 and 2 are shown two common styles of disconnecting switches, one for front connection, and the other for connection to the rear of the support. The dimensions indicated are those which are required for estimating the force of repulsion. The magnitude of this force is the same, within a moderate percentage, as for the simple circuit shown in Fig. 3.

The mechanical force acting on the blade of length B is due to the interaction of the current in the blade, and the magnetic field in which it lies. This field is fairly uniform, and its average value is that of the center line of the blade. The studs of the rear-connected switch, Fig. 2, are usually small in diameter, but the magnetic field which they produce is the same as for round rods of any other diameter, such as those of diameter D, in Fig. 3. The jaws of width D, Figs. 1 and 2, are rectangular in shape. There is only a small percentage of difference in the result if they are assumed to be flat and very thin, or if they are assumed to be round and of diameter D. The latter assumption is used in this article and is more suitable, especially for most large disconnecting switches, which are built up of two parallel straps, to give greater stiffness. The repulsion on the part of the blade inside the jaws is partly positive and partly negative, according to the direction of the magnetic field through that part of the blade. The resultant is proportionately not large and has been neglected.

The force on the blade acts in a direction perpendicular to the length of the blade. Half of this force is carried by the hinge, and half by the friction of the break-jaw, or the latch, if one is used. In this article, the force which is calculated is the force at the center of the break-jaw, which is resisted by the friction of the jaw or by the latch.

The force given by the formulas and curves is the average force, or the steady push, exerted by the current. It must not be forgotten that with alternating current the force rises to double the average value every cycle. This is of some importance, especially at the low frequency of 25 cycles.

Derivation of Formula.

The magnetic field produced by the round rod of length A is in circles around it and is the same, outside the metal, as if the current were concentrated at the axis. The flux density at dy, Fig. 3, due to the element of current dx, is *

*Elements of Electricity and Magnetism, by J. J. Thomson. Art. 211, page 356.

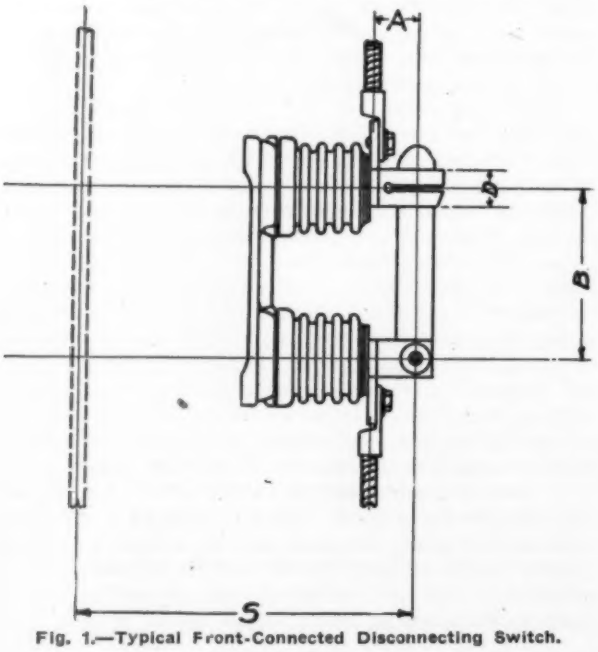


Fig. 1.—Typical Front-Connected Disconnecting Switch.

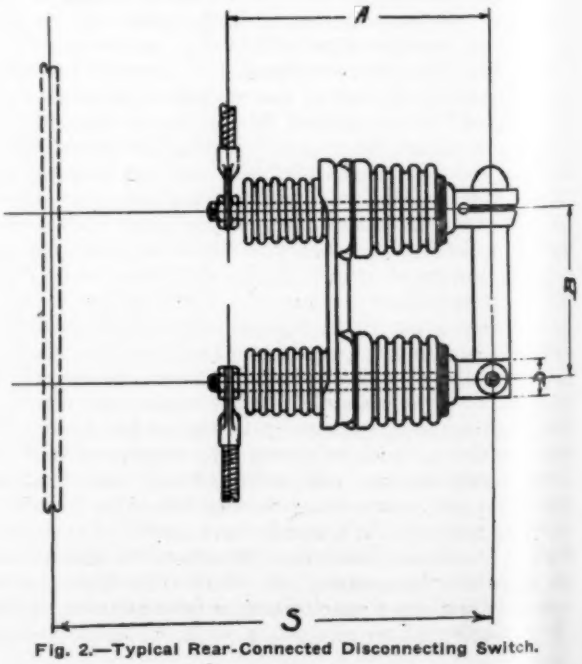


Fig. 2.—Typical Rear-Connected Disconnecting Switch.

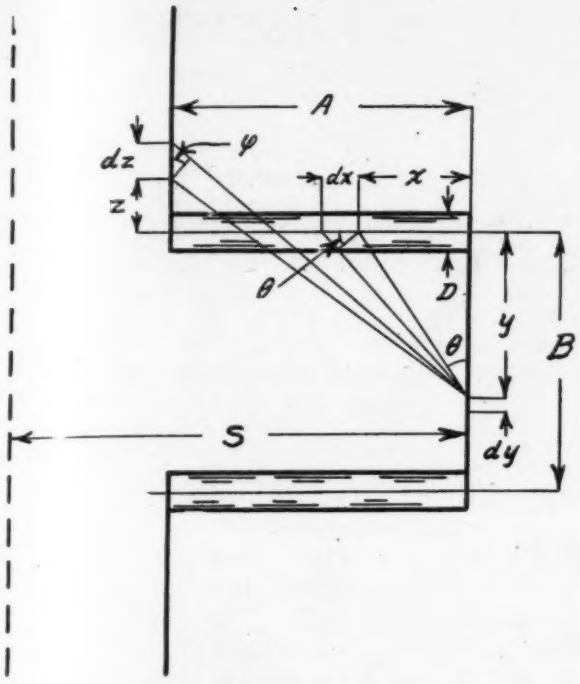


Fig. 3.—Typical Circuit of Disconnecting Switch.

$$\frac{I\,dx\cos\Theta}{10(x^2+y^2)} = \frac{I\,y\,dx}{10(x^2+y^2)^{\frac{3}{2}}}$$

lines per square centimeter, where I is the effective current in amperes.

The flux density at dy due to the rod of length A, is

$$\frac{I}{10}\int_{x=0}^{x=A}\frac{y\,dx}{(x^2+y^2)^{\frac{3}{2}}} = \frac{IA}{10y\sqrt{y^2+A^2}}$$

The mechanical force acting on the blade due to the rod of length A is

$$\frac{I^2}{100}\int_{y=\frac{D}{2}}^{y=B}\frac{A\,dy}{y\sqrt{y^2+A^2}}$$

$$= \frac{I^2}{100}\left[\log h\left(\frac{A+\sqrt{A^2+\frac{D^2}{4}}}{\frac{1}{2}D}\right) - \log h\left(\frac{A+\sqrt{A^2+B^2}}{B}\right)\right] \quad (1)$$

dynes, where the symbol *logh* denotes the hyperbolic or natural logarithm. An equal force acts on the blade due to the lower rod of length A.

In finding the force due to the connections parallel to the blade, the flux density at dy due to the upper connection is in the opposite direction to the flux previously considered and is

$$\frac{I}{10}\int_{z=0}^{z=\infty}\frac{-dz\cos\phi}{A^2+(y+z)^2} = \frac{I}{10}\int_{z=0}^{z=\infty}\frac{-A\,dz}{[A^2+(y+z)^2]^{\frac{3}{2}}}$$

$$= \frac{I}{10}\left[-\frac{1}{A}+\frac{y}{A\sqrt{A^2+y^2}}\right]$$

The force on the blade due to the upper connection is

$$\frac{I^2}{100}\int_{y=0}^{y=B}\left[-\frac{1}{A}+\frac{y}{A\sqrt{A^2+y^2}}\right]dy$$

$$= \frac{I^2}{100}\left[-\frac{B}{A}+\frac{\sqrt{A^2+B^2}}{A}-1\right] \quad (2)$$

dynes.

In some cases the return conductor is brought back directly behind the disconnecting switch at a distance S, as indicated in Figs. 1, 2 and 3, and this adds to the force tending to open the switch. The formula is well known and may be obtained in a similar manner to equations (1) and (2), as follows:

The flux density at dy due to the part of the return conductor above the center of the switch is

$$\frac{I}{10}\int_{z=-\frac{B}{2}}^{z=\infty}\frac{S\,dz}{[S^2+(y+z)^2]^{\frac{3}{2}}} = \frac{I}{10}\left[\frac{1}{S}-\frac{y-\frac{B}{2}}{S\sqrt{S^2+\left(y-\frac{B}{2}\right)^2}}\right]$$

The force on the blade due to this part of the conductor is found by integrating from $y = 0$ to $y = B$, and is equal to

$$\frac{I^2}{100}\left[\frac{y}{S}-\frac{\sqrt{S^2+\left(y-\frac{B}{2}\right)^2}}{S}\right]_{y=0}^{y=B} = \frac{I^2}{100}\,\frac{B}{S} \quad (3)$$

dynes. This is the part of the force supported by the friction of the break-jaw, and it agrees with the usual formula for the repulsion of two infinitely long, parallel conductors.

The total force supported at the break-jaw is the sum of expressions (1), (2) and (3), and is

$$F = \frac{I^2}{100\times 445{,}000}\left[\log h\left(\frac{A+\sqrt{A^2+\frac{D^2}{4}}}{\frac{1}{2}D}\right) - \log h\left(\frac{A+\sqrt{A^2+B^2}}{B}\right) - 1 - \frac{B}{A}+\frac{\sqrt{A^2+B^2}}{A}+\frac{B}{S}\right] \quad (4)$$

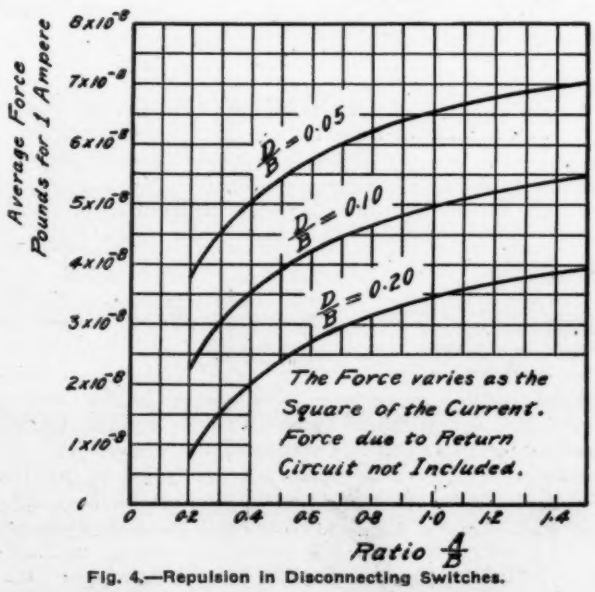


Fig. 4.—Repulsion in Disconnecting Switches.

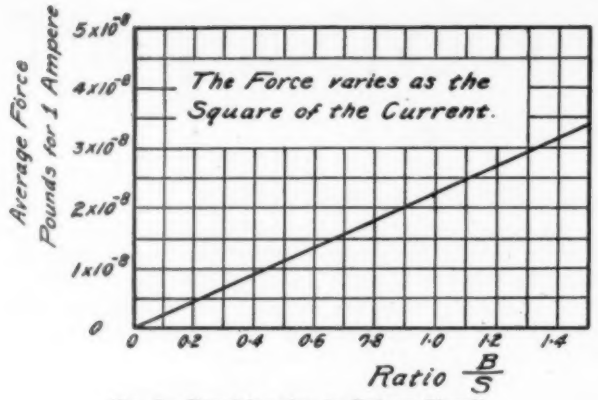


Fig. 5.—Repulsion due to Return Circuit.

pounds, average force.

Formula (4) can be simplified by expanding into series. Thus, when A is less than B, average force in pounds

$$= \frac{I^2}{4.45 \times 10^7}\left[2.30 \log_{10} \frac{A}{D} + 0.39 - \frac{1}{2}\frac{A}{B} + \frac{B}{S}\right] \quad (5)$$

When A is greater than B, average force in pounds

$$= \frac{I^2}{4.45 \times 10^7}\left[2.30 \log_{10} \frac{B}{D} + 0.69 - \frac{B}{A} + \frac{1}{4}\frac{B^2}{A^2} + \frac{B}{S}\right] \quad (6)$$

If the circuit does not return behind the switch, the term B/S becomes zero.

The average force in pounds acting along the center line of the break-jaw, assuming that the circuit does not return behind the switch, is plotted in Fig. 4. If the circuit returns directly behind the switch, the force to be added can be taken from Fig. 5.

These formulas are applicable when the centimeter is the unit of measurement, as well as when the inch is the unit, since only ratios of dimensions appear in them.

EXAMPLE.

To find the average force at 20,000 amperes (effective) tending to open a disconnecting switch in which the dimensions indicated in Fig. 2 are as follows: $A = 16$ inches, $B = 12$ inches, $D = 1.5$ inches and $S = 28$ inches.

$$F \text{ (in lbs.)} = \frac{4 \times 10^8}{4.45 \times 10^7}[2.08 + 0.69 - 0.75 + 0.14 + 0.43] = 23 \text{ lbs.}$$

By Figs. 4 and 5, $F = 4\ (5 + 1) = 24$ pounds.

The maximum force during the cycle is 46 pounds, the force vibrating between this value and zero.

Tree Trimming Upheld in Kentucky.

A decision has just been handed down by the Circuit Court of Shelby County, at Shelbyville, Ky., of special importance to corporations which maintain wire systems in Kentucky. This was in a suit for damages against the Independent Long Distance Telephone Company and grew out of an alleged high-handed action on the part of employees of the defendant company in trimming an oak tree standing on the public road so as to obviate interference with the company's wires. In Kentucky an old legal contention is that the owner of property abutting on the highways holds title to the middle of the road, the owner merely giving an easement to the public for use of the roadway. In the case involved a fine, big oak tree grew just outside the fence line. The company, seeking to avoid a clash with the protesting property owner, took its line to the opposite side of the road at considerable expense, but branches of the oak still interfering, the company's employees lopped them off. Suit for $250 as damages resulted.

A technicality stopped the first trial and the second resulted in a finding by the jury for the defendant, the first court decision of its kind, it is said, in the state. Instructions of the court to the jury were that the defendant has the right to do a reasonable amount of trimming to keep its lines free, the jury being called on to determine whether the company had trimmed more than was reasonable and, if so, to determine the amount of damages. This case will probably not be taken to the higher court of the state, since there is not much involved and since the costs have already been heavy on the plaintiff property owner. But it will serve as an important precedent in numerous other cases and the wire owning corporations have therefore noted the trial result with interest.

War-Time Convention of Indiana Electric Light Association.

The annual convention of the Indiana Electric Light Association was in the nature of a one-day war-time meeting, held at the Claypool Hotel, Indianapolis, on September 26. The attendance was small and the subjects of discussion were confined almost entirely to timely questions brought up by the war. Among these matters given special consideration were the problems of coal and labor supply. In connection with coal it was decided that in case of emergency shortage it would be best to cut off the supply to electric signs and display lighting and if still further need developed to cut the supply to such power customers whose service could be interrupted without affecting urgent Government work. The executive committee of the association was instructed to give careful consideration to the coal problem and to employ, if necessary, a special coal agent to assist the members in securing adequate supplies of fuel.

At the election of officers for the ensuing year there were chosen the following: J. P. Ohmer, of Elkhart, president; T. A. Wynne, Indianapolis, vice-president; Thomas Donohue, Lafayette, secretary-treasurer. S. W. Greenland of Fort Wayne, E. J. Condon of Angola, F. J. Hass of Evansville, P. H. Palmer of Kokomo, and C. C. Perry of Indianapolis are members of the new executive committee. The advisory committee is composed of J. W. Robb of Clinton, H. H. Harrison of Indianapolis, and Thomas English of Muncie.

Coal Mining Resumed.

Public utilities throughout the central states have learned with relief of resumption of operations in the Southeastern Kentucky-Tennessee coal fields, which meant that mines with capacity of from 50,000 to 75,000 tons daily began producing again on Monday, October 8. The strike lasted to within three days of two months and put many utilities dependent on the field for their supplies at a serious disadvantage. Operations resumed on the former basis, with differences submitted to arbitration and an agreement that the terms decided on were to hold for the duration of the war. A sub-normal production will be inevitable for a time until mining organizations are running smoothly again and forces again recruited up to normal.

Production of Electricity by Steam Power

Further Extracts From Address Before Electrochemists—Comparison of Power Transmission and Local Generation—Possibilities of Further Economies in Steam-Electric Plants

By ALEX DOW

President and General Manager, Detroit Edison Company.

SOME interesting figures were obtained when asked to furnish the American cost in transmission from coal mines. In England they started with an assumed loss of 15 per cent, with the preliminary result that with English freight rates they could not move freight trains as cheaply as electricity. But American freight trains, hauling short tons at something like one-third of a cent per mile, could move it more cheaply than electricity. There you see you must balance one against the other.

Again, transmissions are not reliable. I have been considering that and lightning troubles. This was a year notable for lightning, when lightning was painful and frequent and free. We have such things as lightning arresters and they take care of secondary surges; but when you get a real direct stroke of lightning you go around with a shovel and clean up. Let the temperature be 30 degrees below zero, and the electric stress be scores of kilovolts, and then get our hottest summer weather, and the porcelain insulator is supposed to adjust itself to all of these conditions while placed inside of a rigid cap and it is expected to stay put. Well, there are limits to human beings and there are limits to the elements which constitute these porcelains. Then you will find that lines which behaved splendidly for seven or eight years after that time behave miserably. And the cost of changing them is a very considerable limit. There are three to a tower and at $10 each, makes $30 for each tower, and in a hundred-mile line that is an item.

Now, another thing you must balance is unreliability. Then do not forget cyclones. You must balance permissive unreliability with that over which you have no control. If you are generating by steam power it is probable that your big plant will be per se more reliable than any plant you can restore on your own premises; but the intervening link may change conditions. You must consider whether you want your process to hinge upon the unavoidable conditions which I pointed out.

The distribution loss I spoke of is of the order of 20 per cent of the total. I have some figures here in which the transmission loss is 18.7 per cent; of that, 5.6 per cent is lost in the line, 3 per cent is lost in the substation transformers; loss in the synchronizer is 0.1 per cent; the loss in changing from alternating to direct current is 0.4 per cent; in the storage battery it is of the same order; and then there are distribution losses, line transformers, meter shunts, and slow meters, etc.

Now, as to the question of location versus transmission, it turns not on the question of reliability or unreliability, as duplicate lines could reach that; it turns on your own problems of materials and markets. The answer is, if the power cost controls, you must get to your plant or bring the plant to you; and if the power cost controls, you must go where you can make power cheap. Otherwise you must consider the cost of materials and markets and then make the best adjustment you can between reliability, the location and your own conditions. It would be possible to locate at a considerable number of centers where a given adjustment could be made between all these.

Higher Steam Pressures and Gas Fuel.

What is the possibility of higher steam pressures? This is a question about materials only—I speak of pressure from 300 to 400 pounds. If you get to consideration of the fact that you are working with high velocities in the turbines, with pressures of 300 to 400 pounds per square inch and with temperatures of 700 Fahrenheit, you will realize that the selection and production of suitable materials is a problem. I am told no steel manufacturer will guarantee conditions of steel at the present time. If that is true, the very high pressure turbine will have to be a thing to be dreamed of and not built. The technical difficulties are those of materials. The commercial reasons are likely to keep us under 300 pounds steam pressure and under 700 Fahrenheit for total steam temperature. The history of the things which have been tried to get beyond that stage is unending. Some of us are using high-carbon boiler tubes because we punish them too much already.

As to gas fuel. Yes, there is a chance for betterment in gas fuel. You can control your mixture, lose no carbon in your ashes and have higher transmission values. But gas as a commercial proposition in almost all of the United States is entirely dependent for its cost upon the by-product market, and that, as you know, is anybody's guess. In the meantime, gas producers as an addition to boilers cost too much. No combination in present or recent conditions can be made that will allow gas fuel to be used in steam boilers. The gas engine has its place. At present the large steam turbine has it beaten. With free gas or natural gas the gas engine has its merits.

Pulverized coal must be considered in any new design. It is first class now in locomotives because of the impossibility of firing by hand the present big machines. There is a better control of the air mixture; you cut off your fuel and that is the end of it. It may permit the use of coals which now work very badly in the stokers.

Please remember that coal is not always coal; it is sometimes an invention of the devil which should be called by another name. Coal that works into a kind of molasses candy is an exasperation and not a

fuel, also coal that fluxes down your furnace walls, and coal that is sensible of anything but acid bases—the coal for one kind of fire-brick may be the worst kind of coal for another kind.

Now, the whole question of pulverized coal turns upon the point that it may make useful coals which with stokers of the present time are not useful. That may tend to reduce total power cost. The big point is to adopt the plant design to the fuel you are going to use.

Care in Constructing High Furnaces.

One very important point is the value of a very high furnace. Some of our good friends come to see us, see our big boilers with hot fires and water-cooled bridge walls and our cooled sidewalls, and they think they have got it all. They land in bad trouble. For one thing, they do not realize and appreciate the reason for the very high furnace. In general a high furnace will burn low-volatile coal, whereas the low furnace will not burn the high-volatile coal because the flaming gases are in the tubes and combustion there is incomplete. And that high furnace means high brick walls and water-cooling of the walls.

High brick walls, unless built on honor and with a keen appreciation of expansion stresses, are a failure and source of trouble. Our walls came down at first, and we rebuilt them. We tell our friends about it and they forget, and when their walls come down they come to us and we repeat what we told them before with respect to our experience. The man who builds high concave walls which are slightly dished so that the stresses due to the heating on the inside are taken care of, who rubs each brick down to its seat, has got to be as honest as the old monkish builders of cathedrals in the middle ages. I do not know whether these furnace men love the Lord—their language would indicate otherwise—but they certainly love their work. It is a job for an artist and not for a workman.

Now, some of our friends come back and say that this particular kind of boiler burns more castings than coal; and that is to appreciate an elementary rule in physics, which is, that it takes time to cool carbon. Therefore, if you have a cross-section down which your ashes must go, they must travel very slowly down that given cross-section or you must increase the total length of it.

Overstoking is another trouble. We sometimes drive some of ours 300 per cent. We do that because the load-factor is so bad that it pays to drive the furnace and boilers to the extreme limit during a short period, rather than put in twice as much furnace and twice as much boiler, and work it more reasonably. Now, overstoking means all sorts of things, if you work up to the limit. If you shut them down you have the firing back into the retorts and stoker boxes, into the hoppers and sometimes into the chutes that go into the boilers. There is a limit, a compromise, that in these days must be based upon experience.

What I have told you of efficient design for making steam efficiently is based on man-sized experiments in which were determined the upper and the lower limits. The rule of finding how far you could go before trouble started, and then how far in the reverse direction you could go after the trouble started is the only rule to give you anything proper. But to go in one direction a great way because a little has proven well is bad engineering.

Another fact to be considered is that some stokers work beautifully in comparatively cool furnaces. The coal is in a condition of plasticity, but with higher temperatures the coal becomes viscous. To see a stoker which is simply churning the fuel instead of stoking is not a rare sight.

Turbine Troubles.

Now, turbine troubles exist, of course. Your turbines, most of them, are fine ladies, so to speak; treat them right and they will treat you properly; and if you do not they will have hysterics or the mechanical equivalent thereof. There are a few bad turbines. If you put 200 tons of turbine and place it on a foundation it is well after six months' time to examine that turbine foundation to see if it has not settled. If you examine it, you will see that the turbine has been telling you its message for the past six weeks and you have given no heed to it. A well made piece of machinery, such as a turbine, requires on the part of those using it a little imagination to know what is going on on the inside.

We have a tradition in our service to start anything on a Friday, and they have a record of 30 years of success in doing so. There is another tradition that accidents run in threes, and usually there was considerable peace after the third successive trouble occurred in our outfit. One small turbine, a well-built machine, for some cause unknown, lifted itself out of its bearings, waltzed across the floor and killed a man. That was a small machine. Machine No. 2 came through properly. The man who was proposing to stop the machine shut off the exhaust before closing the throttle. With a development of 250 pounds pressure in the exhaust you can imagine as well as I can tell you, just what happened.

Then everybody waited for No. 3; and when a 20,000-kilowatt machine started to vibrate there was a rush. We opened her and we found something which we will have an answer for some day from our technical friends. Two disks had developed cracks. One had gone through the rim and was starting peripherally. In that particular large machine all that happened was that the blading had pulled out and was hitting the casing. The machine might have run some time before developing trouble. We cut off that row of blades and another, and a machine which did previously 22,000 kilowatts now does 18,000 kilowatts with two disk rows out. It is a 13½-pound machine instead of 11½. But we are much at peace now that we know.

The story of what happened to steam valves in superheat is an old story of little troubles where you get oil into the feed water and the clogging of turbine blades which we cleaned with a toothbrush I can recall vividly. Nowadays we feed liberally with kerosene while running, and we have thus discovered a practical way of satisfying that point.

Now, in closing, it is not good to prophesy, but I know some of you expect to hear from me whether I anticipate any great change in the art. I do not, just now. All I can say is there is not in sight any great change. Unless we can find the materials to take us into higher temperatures and pressures, boiler efficiencies of 80 and 90 per cent, we need not expect much change there. The remaining losses are commercial, which cannot be saved profitably, and the losses necessary to the stack to give you the necessary draft and combustion, and big losses of heat thrown overboard, they seem to be inherent in steam. There may be a cycle produced which will solve all this. There is a man waiting for me to come home, ready now to produce that cycle; I hope he has it.

Editorial Comment

What Liberty Bonds Stand For

By a Soldier of the National Army.

THEY say, who have come back from "Over There," that at night the troubled earth between the lines is carpeted with pain. They say that Death rides whistling in every wind, and that the very mists are charged with awful torment. They say that of all things spent and squandered there, young human life is held least dear. It is not the pleasantest prospect, but our love of life is not so prized as love of right. In this renaissance of our country's valor, we who will edge the wedge of her assault make calm acceptance of its hazards. For us the steel-swept trench, the stiffening cold—weariness, hardship, worse. For you for whom we go, you millions safe at home—what for you? We shall need food. We shall need care. We shall need clothes for our bodies and weapons for our hands. We shall need without failure supplies and equipment in a stream that is constant and never-ending. From you who are our resource and reliance, who are the heart and hope of that humanity for which we smite and strive, must come these things.

Men of the Electrical Industries, buy your country's bonds. Buy them, today! The United States Government bonds of the Second Liberty Loan of 1917 are investment made safe for the people. They are in the highest possible sense a security *of* the people, *by* the people, *for* the people. They can be had in denominations so low and on such terms that virtually every citizen of this nation may share in the benefits they bring and the purposes they serve. They are today the safest possible investment in the world. Buy your country's bonds. Buy them, as the mainspring of our holy endeavor. As your duty to the cradle and your fealty to the tomb, buy them. Buy them, today!

Mail Efficiency—What It Means

IF ELECTRICAL and other manufacturers of the country, as well as jobbers, contractors and dealers, can be induced to adopt the new federal plan for the early mailing of letters, instead of letting them accumulate to be mailed at the end of the day, they will revolutionize not only post office methods but also business system throughout the United States. This is the judgment of Samuel Insull, whose experience in matters of business efficiency is very extensive. He is quoted in a Chicago daily paper as follows:

"The problem involved in bringing about the early and continuous mailing of letters and parcels, of keeping mail cleaned up throughout the day, is the same problem as is involved in making any public utility company, any manufacturing company, a success. The great efficiency in anything flows from constant, steady, and uniform production. It doesn't matter whether this production takes the form of manufacturing an article, doing clerical work in an office, or of sorting and dispatching mail. People should be kept at work during the whole period that they are being paid. That is the secret of manufacturing success.

"The Chicago postmaster, Mr. Carlile, in proposing this reform, was thinking only of the post office, but it would facilitate the work of every office in Chicago. It would mean that fewer clerks could do the same amount of work or that the same clerical force could do more work, in either case making markedly for economy of office expense.

"I am personally very much interested in this question, because I have been asked by the Federal Government to take up all questions referring to greater efficiency of man power. I believe if the scheme were carried out it would revolutionize the man-power problem in offices. Look at the Commonwealth Edison Company and the Peoples Gas Company. They have exactly the same problem in the reading of gas and electric meters, of which there are more than 900,000 in Chicago. We don't have them read on a few days at the end of the month. By no means. We have our men read them every day of the month. By that we get the greatest efficiency from the men we employ to do this work.

"Men who are in the habit of getting their mail to its destination quickly have followed this rule for years. Take the mail between Chicago and New York, for instance. If a letter is posted on Monday morning before 12, it goes on the twenty-hour train and reaches New York the next morning. If replied to at once the answer is here Wednesday morning. If the posting of that same letter were delayed until Monday afternoon, it would not reach New York until Wednesday morning; and the answer, if posted in the same maner, would not reach here until Friday morning. Thus there are two clear days wasted.

"There is nothing more efficient than steady work, and any manager of an office who gives orders to have his mail cleaned up and sent to the post office every hour is adding to the efficiency of his own organization and, in the long run, aiding the economy of operation of his office, which, in these times, is all important, as conservation of man power is a national necessity.

"The clerks wouldn't lose anything. Rather, they would gain. When a clerk is able to be productive all day he is worth more money and will get more money, because each unit of work he does will cost less money, even at the higher rate of pay. It simply means that more work will be done.

"Again, this plan will do much for the employees of the post office, which, I am told, is now somewhat short of men because of the number taken by the draft. It will make the work of the men employed at the post office steadier, thus relieving them from extraordinary efforts during the hours of the 'peak load,' and probably doing away, in a considerable measure, with some of the present length of their working day."

Application of the facts made by Mr. Insull can, of course, be made to any manufacturing and jobbing center, and they are commended by the ELECTRICAL REVIEW to its readers.

Reorganizing the Contractors and Dealers

AN important branch of the electrical industry is entering an epochal period, in which its organization, methods of conducting business, and its relations with other branches of the industry are to undergo a revolutionary change. By the unanimous adoption of the new constitution at its New Orleans convention last week, the National Electrical Contractors' Association has shown its hearty approval of what has come to be known as the Goodwin Plan of greatly broadening the scope of activities and influence of the association. Its ratification by requisite number of state associations of electrical contractors is also assured, so that for all practical purposes it may be said to be in full effect.

In a nutshell the Goodwin Plan provides for reorganization of the National Electrical Contractors' Association on a much larger scale, so as to be a more representative body of all the electrical contractors and electrical retail dealers of the country; it provides for local, district, state and divisional sections and meetings, so that the educational and other benefits of the entire organization may be brought directly and personally to even its most humble member; it provides, moreover, for earnest co-operation with manufacturers, jobbers, central stations, architects, engineers and other interests with which the contractor and dealer comes into contact. In other words, it is a far-reaching plan of organization that should solve the difficulties this branch of the industry has had to meet and put it on a firm and sound business basis.

What the electrical contractors and dealers think of this plan and of its father was shown by the ovation that was given to Mr. Goodwin at the New Orleans meeting last week. The report of the convention and Mr. Goodwin's splendid address are given *in extenso* on other pages of this issue. Noteworthy features of the address, which constituted the climax of the meeting, are its breadth of vision and searching analysis of the industry to get at the fundamental causes for its many ills. Especially unique is Mr. Goodwin's comparison of scientific merchandising to a Wheatstone bridge that must be kept in balance to achieve the results desired. His clear portrayal of the industry's ills and his frank discussion thereof are bound to open the eyes of many and lead to wholesome reforms. On the Pacific Coast, where many of Mr. Goodwin's ideas have already been put into effect, they are working out to mutual advantage of all concerned. It is to be hoped that equally good and much more far-reaching results will accrue from the general adoption of these ideas throughout the country.

Effective Fuel Conservation

ALMOST tangible object lesson in the saving of coal and fuel oil is given by the Chicago, Milwaukee & St. Paul Railroad in the operation of two of its divisions in Montana. This refers to the electrification of those divisions, the disuse of steam locomotives and the moving of all trains by electric power produced at hydroelectric plants. One of these, the Rocky Mountain division, which previously used coal-burning engines, would have required 200,000 tons of coal in moving the last year's traffic; the other dvision, known as the Missoula, on which oil-burning engines had been used, would have consumed 425,000 barrels of fuel oil for the last year's traffic. Within the next ten months, the Cascade Mountain division of this road, now being electrified, will cease to use steam power. That part will extend from Tacoma and Seattle eastward to the eastern slope of the Cascade range. This third division of electrified road will mean the further conservation of the 375,000 barrels of fuel oil per year now required in its operation.

Thus, the conservation of 200,000 tons of coal and 800,000 barrels of oil per annum in the operation of about 725 miles of railway makes a considerable impression in the fuel-supply problem. It is 18 per cent. of the fuel saving effected by the reduction of passenger train service on all the railroads of the United States for the year. The reduction referred to has been made for war economy and has resulted in cutting out 16,267,028 train-miles of service and the saving of 1,120,000 tons of coal previously consumed in this excess train service.

Even though electrical energy for train service were supplied from steam-electric plants, in localities where water power is not available, the net result would be an important conservation of fuel supplies. In the face of all facts that may be brought to bear in favor of water-power development to produce electrical energy, why should any legal barriers remain to discourage and retard it?

HAPPENINGS IN THE INDUSTRY

Electrical Manufacturers Form New Sections—Contractors Favor Reciprocal Insurance—Shipyards to Be Consolidated —Plans for Jovian Convention—New York Show Success

ASSOCIATED MANUFACTURERS OF ELECTRICAL SUPPLIES FORM NEW SECTIONS.

Two New Sections Organized—Meetings and Election of Officers of Other Sections.

At the meeting of the Lighting Fixture Section of the Associated Manufacturers of Electrical Supplies held in New York City on October 2, it was decided that the interests of the respective manufacturers could best be served by segregating the work of the industrial-reflector and street-lighting manufacturers in a separate section, the interior-lighting fixture manufacturers to continue as an independent section.

The new Section will be known as the Industrial and Street-Lighting Fixture Section. C. O. Baker, of the Wheeler Reflector Company, Boston, Mass., was elected chairman of the new section, C. E. Stephens, of Westinghouse Electric & Manufacturing Company, secretary, and W. H. Jones, of the General Electric Company, treasurer. The section has outlined extensive plans for an active year and it is felt that it will prove of great advantage and benefit to the manufacturers interested. All manufacturers of reflectors, industrial and street-lighting fixtures and parts, members of the association, are eligible for affiliation with the new section.

The manufacturers of miscellaneous insulating materials held the second meeting at the offices of the Associated Manufacturers of Electrical Supplies, 30 East 42nd Street, New York, on September 20, at which time it was unanimously voted to form a section in the Association, to be called the Insulating Materials Section. This section will include in its membership manufacturers of the following material:

Treated cloths, built-up mica, insulating varnishes, friction tape, treated papers, raw mica, insulating cements, splicing compound, untreated tapes and other miscellaneous insulating material.

It was originally planned to include these manufacturers as a committee of the Molded or Formed Insulation Section in the Association, but it was found that this would make this section too large and unwieldy and it was felt that better results would accrue to all by forming an entirely separate section, where the manufacturers would have common interests.

J. G. Miles, of the Westinghouse Electric & Manufacturing Company, was elected chairman of the section, J. B. Adams, of the Mitchell-Rand Manufacturing Company, secretary, and A. E. Beling, of the Western Electric Company, treasurer.

The Porcelain Section of the Associated Manufacturers of Electrical Supplies held its regular fall meeting on October 3, at the offices of the Association. The following officers were unanimously re-elected for the coming year:

J. E. Way, of R. Thomas & Sons Company, chairman; C. M. Semler, of Pittsburgh High-Voltage Insulator Company, secretary; B. B. Dinsmore, Imperial Porcelain Works, treasurer.

In accordance with the plan of the recently formed Tariff Committee of the Association, that each section appoint a special Tariff Committee to work with the Tariff Committee of the Association, H. R. Holmes, of R. Thomas & Sons Company, East Liverpool, O., and B. B. Dinsmore, of the Imperial Porcelain Works, Trenton, N. J., were appointed members of this section committee, Mr. Holmes being chairman. In addition to the regular standing committees of the section, the following committees were also appointed:

Freight Classification Committee—B. B. Dinsmore, Imperial Porcelain Works, Trenton, N. J.; H. R. Holmes, R. Thomas & Sons Company, East Liverpool, O.; B. F. McLean, chairman, Ohio Brass Company, Mansfield, O.

Pin Threading Committee—H. R. Holmes, chairman, R. Thomas & Sons Company, East Liverpool, O.; B. A. Plimpton, Locke Insulator Manufacturing Company, Victor, N. Y.; C. M. Semler, Pittsburgh High-Voltage Insulator Company, Berry, Pa.; E. B. Snyder, Ohio Brass Company, Mansfield, O.

Committee on Japanese Matters—B. A. Plimpton, chairman, Locke Insulator Manufacturing Company; B. B. Dinsmore, Imperial Porcelain Works; F. L. Bishop, Hartford Faience Company, Hartford, Conn.

The Molded and Formed Insulation Section of the Associated Manufacturers of Electrical Supplies held its regular fall meeting on October 5, at the offices of the Association, E. B. Hatch, of the Johns-Pratt Company, chairman, presiding.

The following officers were unanimously elected for the coming year: R. W. Seabury, of the Boonton Rubber Manufacturing Company, Boonton, N. J., chairman; Henry T. Meyer, of the Duranoid Manufacturing Company, secretary; Joseph Rockhill, of the General Insulate Company, treasurer.

ELECTRICAL CONTRACTORS COMMEND INSURANCE WITH UTILITIES INDEMNITY EXCHANGE.

Address by L. T. Block Favorably Received Before New Orleans Convention of N. E. C. A.

At the executive session held on the afternoon of October 11, as part of the annual convention of the National Electrical Contractors' Association at New Orleans, La., Lynton T. Block, attorney and manager of the Utilities Indemnity Exchange, the officially adopted insurance organization of the association furnishing workmen's compensation, fire and liability insurance to the members of the association, was called upon, since he had been prevented by late trains from being present at the opening session on Wednesday morning, for which he had been scheduled to address the meeting. In his talk Mr. Block touched briefly on the plan of the Utilities Indemnity Exchange and

the means by which this Exchange is effecting large reductions in the cost of insurance to those contractors who are availing themselves of the opportunity afforded by this form of reciprocal insurance. Mr. Block spoke in part as follows:

"It is but natural that the actual return of savings in money to the policy holders of the Utilities Indemnity Exchange should impress itself upon those policy holders as being the principal benefit accruing from the organization. The savings, of course, are the one big tangible benefit and they have aggregated over $80,000 returns in cash, with large sums saved in addition but as yet undistributed. But this is only one of the prime objects. 'Service' is the paramount idea. Service is the watchword of the Exchange and as respects adjustment of injury claims we have coined our own definition of it. We define service as 'Furnishing that which is wanted, at the time it is wanted, and in the manner in which it is wanted.' We desire at all times to so treat the injured parties as to preserve cordial and loyal relations between the employer and his valued employes. That we have absolutely maintained this attitude is borne out by the fact that we have handled some 5000 cases of injury and not in a single instance have we had any expressions from the policy holder other than complete satisfaction and appreciation."

At the close of Mr. Block's address many members present spoke in commendation of the service and savings they had received and voiced enthusiastic praise of the Exchange and what it is doing for the N. E. C. A. Among those expressing themselves thus were James R. Strong, of New York, Earnest McCleary, of Detroit, W. C. Peet, of New York, Robley S. Stearnes, of New Orleans, and others.

CONSOLIDATION OF VAST SHIPBUILDING OPERATIONS EFFECTED.

Bethlehem Shipbuilding Corporation Formed to Facilitate Work and Avoid Duplications.

Consolidation of the operation of all of the various electrically operated shipbuilding yards controlled by the Bethlehem Steel Corporation under a new corporation to be known as the Bethlehem Shipbuilding Corporation, Ltd., in order to co-ordinate and expedite work on the increased volume of government shipbuilding demands has been announced in New York.

The new company will be capitalized at $12,500,000, all the stock to be owned by the Bethlehem Steel Corporation or its subsidiaries with the exception of directors' qualifying shares. The president will be E. G. Grace and the vice-president in charge of sales and operations will be J. W. Powell, now president of the Fore River Shipbuilding Corporation, Quincy, Mass., included in the merger. The other companies involved are the Union Iron Works Company and the Union Iron Works Dry Docks Company, San Francisco; Harlan & Hollingsworth Corporation, Wilmington, Del.; Samuel L. Moore & Sons' Corporations, Elizabeth, N. J., and the shipyard at Sparrows Point, Md., now operated by the Bethlehem Steel Company.

"The demands of the Government on the facilities of shipbuilding plants will make it essential that all duplications of engineering and similar overhead work shall be avoided so far as is possible, and the proposed consolidation is expected, through the resulting standardization and the centralization of management to increase the production of the yards affected—a result of vital importance in this time of insistent demand for expedition in the building of ships," the Bethlehem announcement said.

Following this, the scope of the recent conferences between the war industries board and the committee of steel representatives was explained in the following statement issued by Judge E. H. Gary, chairman of the United States Steel Corporation, at the request of newspaper men:

"On the whole, it may be said the negotiations with the war industries board and the results were satisfactory to the steel producers, although the prices named are lower than had been expected.

"The disposition of the members of the board to carefully inquire into the facts relating to cost, capacity, facilities, and profits has been so fair and frank that the manufacturers without exception will be influenced to respond to the request of the board for productions equal to full capacity."

PURCHASE BY PASADENA OF EDISON DISTRIBUTING SYSTEM.

Deal Declared a Victory for Neither Municipal Nor Public Utility Ownership.

The ELECTRICAL REVIEW of September 29 contained a brief summary of the preliminary agreement between the city of Pasadena, Cal., and the Southern California Edison Company, under which it is proposed that the city purchase the company's electric distributing system, within the city limits, and enter into a long-term contract to purchase power from the company, which owns large hydroelectric generating plants and transmission lines to Pasadena and other centers of power consumption. In the resume referred to some facts and figures were drawn from the report of C. W. Koiner, general manager of Pasadena's municipal plant, to the Commissioner of Municipal Utilities, in which he recommended that the deal be ratified by the city. In this connection the statement was made that the plan of settlement would remove more than 6000 duplicate poles from the city streets and would "eliminate waste due to competition that has been strangling the growth of the municipal plant."

Mr. Koiner, in a letter to ELECTRICAL REVIEW, takes exceptions to the use of the words "waste" and "strangling" in the concluding sentence above, and desires to make it clear that the proposed deal is a purely business proposition; that the Edison company did not have to sell, nor was the municipality forced to buy, and contract with the company for power. He further says: "The facts are we have 9900 meters connected, and the Edison Company has 5000, showing that both can get along here indefinitely, and both Mr. Brackenridge and myself had agreed that the statement would be made that would not be construed to mean, by the advocates of either municipal ownership or private ownership, that either one of us had been killed off."

COAL MINES DOING THEIR BIT.

Daily Output of Coal Breaks All Records to Meet This Year's Big Demands—1917 Tonnage Promises to Exceed 1915 Record by 25 Per Cent.

So much is being said about the shortage of bituminous coal, and the general public realizes so little the important gains in output made by the operators under trying conditions last summer, over all pre-

vious records, that the statement just issued by the United States Geological Survey, Department of the Interior, on production in 1917 compared with 1916 is particularly timely. In commenting on this report, prepared by the statisticians of the Geological Survey, Director Geo. Otis Smith points out that the shortage is not due to the failure of the soft-coal mines to produce more coal than in the past, for the country on September 1 was about a month ahead of last year in output and is expected to finish the year with an increase of 10 per cent over 1916, the banner year, and of 25 per cent over 1915.

The tremendous increase in manufacturing and transportation activity this year has created a demand for soft coal in excess of any in the past, an increase in demand that is difficult to measure in terms of tons, but that is certainly more than the 10 per cent by which production has increased. To meet this demand the mines have been producing soft coal at a rate never before equaled. In the second week of July, 1917, the average daily production was more than 1,900,000 tons, the highest point yet attained; in the middle of August the lowest rate for the summer, 1,638,000 tons, was recorded; and in the last week of September the daily rate was 1,823,000 tons. In the first eight months of 1917 the output of soft coal was 363,500,000 tons, or 37,000,000 tons more than in the first eight months of 1916. In the same period shipments of anthracite increased 16 per cent over those of 1916.

PLANS COMPLETED FOR IMPORTANT JOVIAN MEETING.

Two-Day Annual Meeting at New York City Will Consider Problems of Vital Interest to all Members of Jovian Order.

The annual convention of the Jovian Order, which is to be held on Monday and Tuesday of next week, at the McAlpin Hotel, New York City, promises to be one of the most important ever held by this fraternal organization of electrical men. The officers have been very busy completing a program that should attract all members. The plans are for an intensive two-day session, devoted almost entirely to the problems confronting the organization and free from the very elaborate entertainments that have usually been provided at these annual gatherings. It was felt that in view of the strenuous times through which the country is passing, efficiency in the conduct of the meeting was imperative.

In planning the matters to come up for consideration it has been felt by Jupiter Henry L. Doherty that the Order may materially aid in a much more general co-operative movement throughout the electrical industry than has ever yet been undertaken. Matters dealing with the patriotic duties of all members will be brought up for consideration. Many important business matters relating to the conduct of the Order will also be acted upon. Of these several involve vital changes in its methods of operation. The matter that has been given a great deal of study is the placing of the finances of the Order on a firmer basis, commensurate with the broadened activities and needs of the organization. The feature of this plan, now being worked out, is the sale of 200 life memberships of $50 each.

The business sessions will be opened on Monday afternoon by Jupiter Doherty; on Tuesday morning the business session will be opened by John W. Lieb, president of the National Electric Light Association, who will speak on the general conditions confronting the electrical industry at this time. Thirteen important constitutional amendments will be presented at the convention and it is for this reason that a large attendance is necessary.

Although the convention will be distinctly of a business character, the entertainment feature has not been entirely overlooked. On Monday noon, October 22, the New York Jovian League will give a luncheon to all visiting Jovians. Dr. Carl Wallis Petty will be the orator of the occasion and deliver a patriotic address; this luncheon is being arranged by George Williams. At the conclusion of the convention on Tuesday evening, a simple dinner will be given at which it is expected many leaders in the industry will be present.

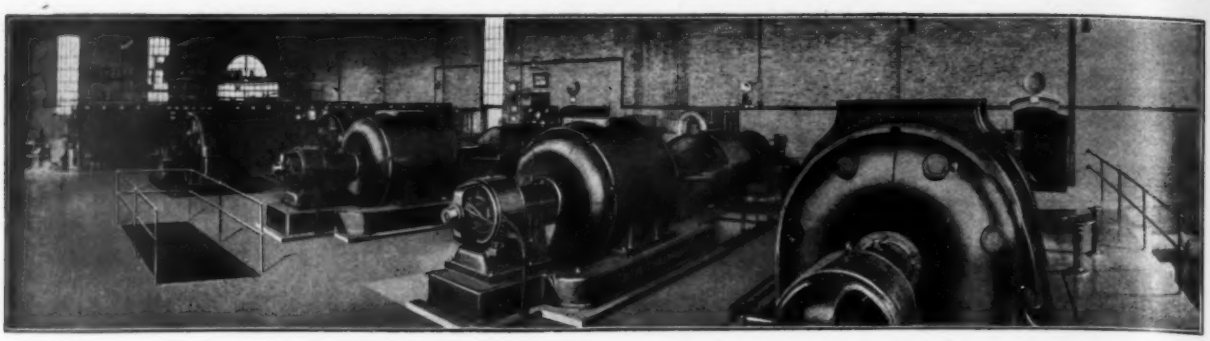
Big Electrical Exposition in New York City.

The Army, the Navy, New York State and the American Red Cross all have exhibits at the annual electrical exposition which opened at the Grand Central Palace, New York, on October 10, for a run of 10 days. These displays, combined with those of the electrical industry, constitute the most comprehensive exhibit and interesting demonstration ever presented. How electricity serves as the power in manufacturing munitions and food products and other war supplies, and is used in the actual fighting on land and sea, in the air and beneath the water, and also in surgery and therapeutics is included in the elaborate exhibit. The American Red Cross, accepting the invitation of Arthur Williams, president of the exposition, has taken over the entire third floor of the Palace.

The electric vehicle industry also participated actively in the exposition. Electric cars and trucks, batteries and other accessories have always been a prominent feature of these expositions in which the year's progress in things electrical are shown and demonstrated. The electric vehicle industry might almost be called a "war bride" because it has benefited greatly from conditions resulting from the war, especially the gasoline situation. This benefit is worldwide and electric vehicle manufacturers in this country have been shipping their product to every part of the world. For example, scores of electrics have recently been placed in service in the cities and towns of South Africa, where gasoline now sells around a dollar a gallon. Thus prosperity was much in evidence at the vehicle battery and accessory exhibits.

America's Electrical Christmas.—The Society for Electrical Development, with headquarters in New York City, is preparing a nation-wide drive for Christmas trade in the electrical line, having for its slogan: "Give Something Electrical This Christmas." Under this society's initiative, Electrical Prosperity Week was successfully held in 1915, and America's Electrical Week in 1916. This year we are to have America's Electrical Christmas. The society is preparing advertising sales helps for the benefit of dealers, through whom the special efforts for Christmas sales are to be made.

Proposed Hydroelectric Development in Japan.—Utilization of water power in Japan for electric generation is receiving attention. Within the first four months of 1917 there were 22 applications granted by the government for water-power development, these plans relating to about 10,000 horsepower.



Notes on Operating Practice

A Department Devoted to Practical Problems of Plant and Operating Practice With Particular Reference to Electrical Generation and Distribution

TESTING LINEMEN'S RUBBER GLOVES EFFECTIVE IN ACCIDENT REDUCTION.

Duquesne Light Company Makes Above Tests Part of Regular Operating Practice.

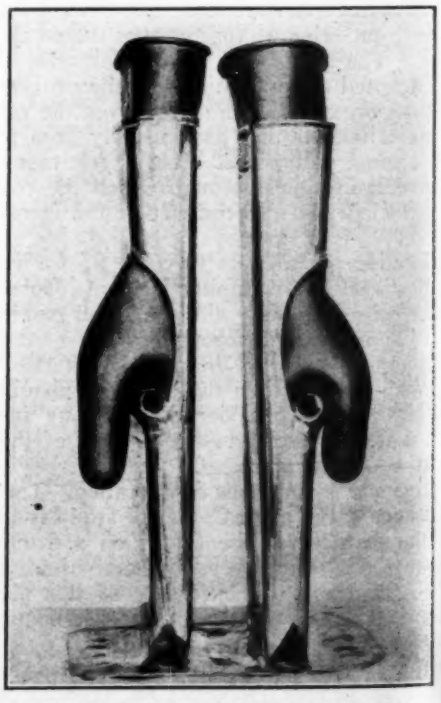
The careful and periodic testing of linemen's and station operators' rubber gloves has resulted from the widespread "safety-first" movement. It has had most valuable results in minimizing accidents and has led to the adoption, among other things, of a rubber glove that affords maximum protection and maximum usability. This glove is made of pure rubber varying in thickness from 0.038 to 0.040 inch (0.97 to 1.02 millimeter), having a guaranteed dielectric strength of 10,000 volts and actually withstanding 18,000 volts. Over this glove is worn a horsehide glove, which protects the rubber one from mechanical abrasion.

In order that the interests of the users of these gloves can be thoroughly safeguarded, the Duquesne Light Company, of Pittsburgh, Pa., has installed in its laboratory the necessary equipment to give all gloves an acceptance test upon their receipt from the manufacturer, and to give periodic tests to the gloves after being issued for service. All used gloves are tested bi-monthly and must withstand the same test as when new. The linemen, operators and other glove-users are compelled to exchange the pair they have in their possession for a new or tested pair on each semi-monthly pay day before their pay vouchers are given them.

The gloves to be tested are transported from the various district headquarters to the laboratory by the general storeroom truck on its regular delivery days. For this purpose each district has a rugged box in which are two or more trays, one above the other, each divided into a dozen spaces 15 inches long by 2 inches wide and 5 inches deep. A pair of rubber gloves fit snugly on edge in each space. The hinged cover is provided with a hasp and padlock, while inside on the cover are two spring clips under which the tester at the laboratory slips his report of the test on the particular quantity of gloves for the information of the district superintendent.

Each used pair of gloves successfully passing the test imposed is placed in a specially made envelope 14½ inches long by 4 inches wide with the gummed fly on the end. Thus inclosed they are placed on edge in the trays, one in a space. The linemen or operator receiving a pair of gloves, sealed in an envelope knows at once that they have been properly tested.

The apparatus for making the necessary tests is simple, but complete. One pair of gloves is tested at a time, being slipped into a specially constructed holder made of copper. This permits the glove to stand with the wrist or gauntlet end open, so that it can be readily filled with water to within one inch of the top. For convenience in filling, a spigot is used on the tank. The glove holder is immersed to within one inch of its top in an iron bucket of water. Ten



Holder for Testing a Pair of Rubber Gloves.

thousand volts is applied between the water inside the gloves and that on the outside.

The testing transformer is located on the floor behind the switchboard, its high-tension terminals being visible in the accompanying illustration. The voltmeter shown on the switchboard is connected to the 110-volt low-tension side of the transformer, but its scale is calibrated to give the corresponding high-tension voltage. There is a rheostat connected directly across the 110-volt line and arranged to supply to the transformer an unbroken range of voltages from zero to full rated potential of the primary winding.

When the testing of rubber gloves was first started on a large scale, investigations were conducted to determine both the charging and the leakage currents of the gloves under test. It was recognized that the water inside the glove separated from that outside the glove by a thin rubber wall constituted a condenser, and that the charging current together with the leakage current could be indicated on a milliammeter in the high-tension circuit. The instruments used for these tests include a very delicate pivot-type indicating milliammeter and wattmeter. The wattmeter does not indicate the energy of the charging component of the current, for the reason that this component is in quadrature with the voltage.

From tests made on a dozen pairs of gloves the average total milliamperes per pair was found to be 17.13 and the average total leakage per pair only 0.25 milliampere. The average energy leakage of a pair was 2.51 watts. These tests were made at 11,000 volts and with the frequency of 60 cycles. At 25 cycles the total current per glove, including charging and leakage, would be 7.14 milliamperes, and at 133 cycles it would be 37.01 milliamperes. The leakage current would be the same proportion of the total current as with the 60-cycle tests. The leakage currents have been found so negligible that it was decided that any glove which would stand the 10,000-volt test for one minute is a safe one to use.

When a glove breaks down under this test a quick-acting circuit-breaker in the low-tension circuit of the transformer gives the necessary protection to the equipment. After the test, the water in the gloves is poured back into the open tank, the gloves withstanding the test are placed on the wooden stands and allowed to drip, a fan being run to assist the drying. After being thoroughly dried both inside and outside with dry towels and with powdered soapstone shaken in them, the gloves are ready for the envelopes, the shipping box and for service. While the periodic tests do not eliminate all defective gloves in service, they do reduce the number to a minimum. The cost per test per pair, is about three cents and is an expenditure that has been found fully warranted.

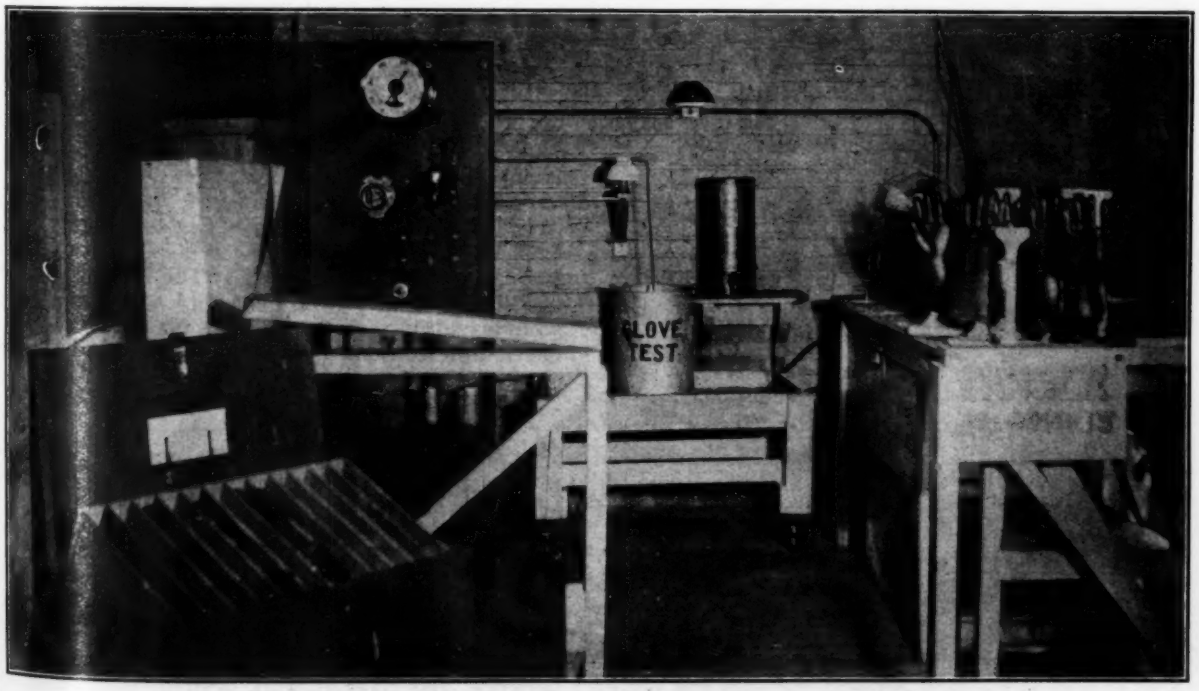
We are indebted to C. W. Ward, superintendent of laboratory, Duquesne Light Company, for the accompanying photographs and data, which should be of special interest to electrical men dealing with high-tension currents.

Trouble Due to Generator Ventilating Fan Rubbing.

At a western central station trouble recently developed from a ventilating fan on a generator rubbing in its shrouding and thereby generating enough heat to ignite the insulation at one end of the armature coils. The unit involved was a 2000-kilowatt turbogenerator. On opening the machine it was found that the insulation was burned for five or six inches and it was necessary to remove the revolving field in order to retape the coils.

While this turbo unit was shut down the step bearing on the 1500-kilowatt vertical turbogenerator was burned out and it also had to be shut down. Fortunately repair parts were at hand and the bearing was fixed at once. While both turbines were down the load on the rest of the equipment was about 160 per cent of rating and there was considerable concern lest something might happen during the interval.

This case illustrates the importance of close atten-



Apparatus for Testing Rubber Gloves in Laboratory of Duquesne Light Company.

tion to the hum and characteristic operating notes of a machine. As a rule a slight change in the note indicates some change in operating conditions and it is well to keep close tab on this feature, as it is a valuable symptom, indicating the development of serious trouble. Of course, it is needless to emphasize that just as in an engine any unusual knocks or vibrations indicate unusual conditions, so in a turbine, an unusual hum should be investigated before actual scratching, due to some parts rubbing, or other trouble develops.

St. Joseph Plant Expects to Save $3,000 a Year in Coal Handling.

During the past month so many improvements have been made at the plant of the St. Joseph (Mo.) Railway, Light, Heat & Power Company that several economies, particularly in regard to coal, are expected to result. The coal storage of 10,000 tons' capacity is nearly completed and at present coal is being unloaded with the 20-ton locomotive crane made by Orton & Steinbrenner, of Chicago, which arrived a few weeks ago. There is about 400 feet of crane track and 1600 feet of track for the coal cars. The coal-storage facilities will be very useful this winter since the former storage capacity was only 250 tons. Because of the added storage room and the improved equipment the St. Joseph company expects to save about $3000 a year in handling coal.

On account of the non-delivery of steel, the coal conveyor across the Burlington trackes is not yet finished, but it is expected that it will be in operation within the next six weeks. Coal will be delivered from a 30-ton Williams swing-hammer coal crusher to a 16-inch belt conveyor, 118-foot span. The belt conveyor is designed to handle 40 tons of coal an hour.

The new 5000-kilowatt General Electric bleeder-type turbine installation is practically ready for operation. The substation is finished with the exception of the roof and it is thought that this will be completed and the transformers and remote-control solenoid switches will be put in operation in about two months. For steam-heat service, the turbine will be able to bleed 40,000 pounds of steam an hour at 10 pounds pressure. A Bailey steam-flow meter has been purchased to measure the steam bled from this turbine.

Large Industrial Heating Load.

The Binghamton (N. Y.) Light, Heat & Power Company has recently connected to its lines the new factory of the United Shoe Machinery Company. This installation consists of 45 horsepower in motors; 30 arc furnaces; one 10-kilowatt oil tempering bath, and two large electric welders. This is the largest heating load that the Binghamton company has so far obtained.

How Service May Be Curtailed to Meet Emergency.

A sprung shaft of one of the two steam turbines at the plant of the Lexington, Ky., Utilities Company. dating from Oct. 10, has been the cause of an enforced curtailment of service, pending repairs to the machine. Factory representatives of the manufacturer have been engaged in making the repairs. This plant supplies the power for the city electric railway lines, the country lines and the street-railway systems of Winchester, Frankfort, Paris and Georgetown, Ky., as well as the local demand for light and power. By crowding the one turbine it was possible to continue railway and power service on a well nigh normal basis, except that service in the outlying communities was shut off, until 4 p. m. At that time lighting demands required curtailment of transportation service, while a considerable part of the lighting load was removed by agreements under which the local merchants dispensed with lighted show windows and power for elevators was shut off.

Motor-Driven Threshing Machine Proves Valuable.

The use of a portable threshing-machine outfit driven by an electric motor has proven very successful on a system of the Durham (N. C.) Traction Company. The installation consists of a 20-horsepower motor, placed on skids and housed over so as to protect it from the weather. The skid mounting permits it to be moved to different locations on the farm and placed nearest to the wheat or oats to be threshed. This installation was made on a large farm some distance from Durham and is attracting a great deal of attention in the neighborhood.

Importance of Most Perfect Constructon in Furnace Brickwork.

The high temperatures used in the furnaces of modern boiler plants require the most careful construction in the building of the furnace walls and especially in the arches and portions actually exposed to the flames. The brickwork is exposed to temperatures in the neighborhood of 2000 degrees, which involve serious expansion stresses that will quickly upset an arch built without special care to overcome weaknesses due to such stresses.

A few weeks ago in a plant in the southeastern portion of the country the flame arches in the furnace of a new 500-horsepower water-tube boiler fell in after only 30 days of service. The boiler in question was not pushed especially hard and the untimely collapse of the furnace walls was evidently due to neglect in their construction. This matter was emphasized in an address by Alex Dow, made before the Pittsburgh meeting of the American Electrochemical Society and which is reproduced in another portion of this issue.

Transmission Line to Lebanon Promotes Economy of Operation.

The new high-tension line, built by the Metropolitan Edison Company, to connect its West Reading power plant with the power plant at Lebanon, Pa., was put in service a few weeks ago and is found to be satisfactory in every respect. The purpose of this new line is to supply the Lebanon load from Reading, 30 miles away, with the Lebanon plant operating as a distributing station. It is already resulting in greater economy in operation and more efficient service for Lebanon and vicinity.

Central Station Offers Exceptional Opportunities to Mechanical Engineers.—The Duquesne Light Company is growing rapidly and has openings for trained and experienced technical men, also for younger men with technical trainings in mechanical engineering and who are interested in modern power station work. Apply in person or by letter, to J. M. Graves, superintendent of power stations, Duquesne Light Company, Pittsburgh, Pa., giving training, experience, and class of work desired, whether operating, efficiency work, or designing.

National Association of Electrical Inspectors

WASHINGTON DEVEREUX, President, 131 South Fourth Street, Philadelphia, Pa.
JOHN KELLY, JR., Vice-President, Camden, N. J.
WILLIAM LINCOLN SMITH, Secretary and Treasurer, Concord, Mass.

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"LET THE CODE DECIDE."

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee, according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

How Many 750-Watt Lamps Are Permitted on a Circuit?

Question 349.—It was the intention of a contracting firm to light a building with 750-watt lamps. They sought advice along the following lines: "Will it be necessary to adhere strictly to the rule given under section *d* of Rule 23 of the Code? If this rule is followed absolutely it will be necessary to run a circuit for each individual lamp or for two lamps at most. Would it not be permissible, provided we used wire of sufficient size and carried this wire to the lamp socket and had a knife switch of sufficient size properly fused at the panelboard for each circuit, to carry four or even six of these 750-watt lamps per circuit?"

Answer 1 (*O*)—It is not permissible under Rule 23*d* to place more than 1320 watts on one final branch cutout unless it be a single lamp.

Answer 2 (*T*)—To be within the intent of the rules the method outlined would not be permitted and a separate circuit should be provided for each lamp. Rule 23, Section *d*, requires a cutout to be provided for each receptacle rated above 660 watts.

Answer 3 (*R**)—This would be a matter of "Special Permission, etc." I do not think it good practice.

Answer 4 (*P**)—Under the Code, a cutout must be provided for each 750-watt lamp. There is no more reason for permitting two of these lamps on a circuit than there is for approving two 20-light fixtures on a circuit. The Code does not insist, however, that a separate circuit shall be run from each lamp back to the panelboard. It might be practicable to place an approved cutout in the vicinity of the lamp.

Answer 5 (*F and G*)—When lamps of 750-watt size are to be installed, each lamp should be connected to a separate individual circuit, as two of these lamps on one circuit would exceed the maximum of 1320 watts permitted by the Code under certain conditions. If, as suggested by the contractor, he be permitted to install four or six of these lamps per circuit, why stop at this number? Make it sixteen or sixty. You might as well make it enough if you are going to break the rule at all.

Answer 6 (*A**)—This depends on what the building is to be used for. If for a public hall, two 750-watt lamps could be installed on No. 14 wire providing that No. 14 wire was connected direct to the socket. If a larger wire is used No. 14 wire could not be tapped on without a branch cutout. It would not be feasible to run a wire as large as would be required to carry the six 750-watt lamps, as this size wire could not be fastened into a socket.

Answer 7 (*H**)—If the construction noted in this question were followed, what becomes of the provision requiring 660 watts on a single subcircuit? It would depend somewhat, of course, upon the construction of the lamp, whether a nitrogen lamp or an arc. The question does not indicate which form is used, but it seems to me that in this territory they would run a separate circuit for each lamp.

Answer 8 (*C*)—If each lamp has an individual fuse, then any number can be placed on any feeder of sufficient size and still be within Code limits; otherwise *no*.

Answer 9 (*K*)—Follow Rule 23*d* strictly.

Answer 10 (*M*)—In the practical application of Section *d*, Rule 23 of the Code, we permit greater wattages than that specified as maximum by the Code, in the belief that the rule does not anticipate the use of single high-wattage lamps. It would be manifestly inconsistent not to permit four or even six 750-watt lamps on a single circuit, provided the wire used was of sufficient size and the switch controlling the circuit was of sufficient capacity, as it is not reasonable to suppose that lamps of this capacity would be removed to connect thereto higher-wattage portable devices. It is my belief that the Code should more practically consider what are now understood as rules of good practice in lighting installations.

Answer 11 (*E*)—I would be willing to allow two 750-watt lamps on one circuit, but would not care to go beyond that.

Answer 12 (*N**)—I do not think Rule *23d* was ever intended to apply to a case like this. The lamp is presumably a type C, Mazda, and requires a mogul socket. This latter is not subject to the wattage limitation of the standard 250-volt, 250-watt socket, but is allowed 1500 watts instead. If you can use 1320 watts per circuit with the standard you should at the same rates be allowed 7800 with moguls or about 10 of these lights per circuit. If they are 115-volt lamps, they take about 7 amperes each and 10 would require 70 amperes, or No. 6 wire (slow-burning for these lamps). Obviously this cannot be wired direct to the sockets. If the size is reduced, the branch must be fused. I should allow as many lamps per circuit as could be placed with the 7-ampere allowance, on the largest slow-burning covered wire, that would enter the socket, properly fused at the panel with a double-pole switch. You can distantly control a motor and I don't see why the limitation which is intended to protect a *standard* socket against a too great short-circuit energy concentration should be invoked against a much sturdier device and a state of the art which the rule antedates considerably.

Question 350.—A one-half horsepower motor attached to a vacuum cleaner, installed in a cellar, is operated by several single-pole switches located throughout the several floors of the building. There is no switch near the motor, the wires are run to a rosette on the ceiling over the motor and portable cord is used from rosette to motor. Is this form of installation correct?

Answer 1 (*O*)—This vacuum-cleaner motor installation described would appear to be subject to criticism for the following National Electrical Code violations:

1. Circuit extended with flexible cord not approved (motors not intended to be moved about should be wired with not less than No. 14 B. & S. gauge wire and not with conductor intended for portable apparatus).

2. Motor-controlling switches not in sight of motor not approved, except by special permission in writing.

3. Single-pole switch not approved for motors over one-fourth horsepower.

4. There is also the possibility that the flexible cord and ceiling rosette may be overloaded by the motor.

Answer 2 (*T*)—Would hardly consider this as meeting the requirements of the Code as Rule 8, Section *C* limits motors to one-fourth horsepower for control by single-pole switches on circuits not to exceed 300 volts.

Answer 3 (*R**)—In the first place a one-half horsepower motor should not be controlled by single-pole switches. In places where a motor is permanently located it is advisable to wire it permanently; a good method in this case would be to place an iron box where the rosette is and finish to the motor with armored cable or conduit. The house control should be double-pole switches, or if single-pole switches are desired an automatic starter can be used.

Answer 4 (*P**)—I should object to the construction outlined principally because of the overloading of the rosette. Objection might also be made to the absence of a switch near the motor.

Answer 5 (*F and G*)—This form of installation is not in accordance with the Code, for several reasons.

First, single-pole switches should not be used to control a motor of greater than one-fourth horsepower.

Second, the switch should be installed within sight of the motor.

Third, the current passing through the motor would probably exceed the rated capacity of the rosette.

Answer 6 (*A**)—I see no objection to the single-pole switches being used as described. I should say it would be better to continue the No. 14 B. & S. gauge wire direct to the motor. The ceiling rosette with portable cord seems to me would be considered poor construction.

Answer 7 (*H*)—It would depend somewhat upon the size of the portable cord between the rosette and the motor, as the starting torque of the motor must be taken into account. I should be inclined to object seriously to feeding a motor through a rosette and should prefer a switch and cutout to control the motor outlet.

Answer 8 (*C*)—A one-half horsepower motor should be controlled by double-pole switches and should *not* be attached by cord or rosette. Solid wires should be used.

Answer 9 (*K*)—No. See Code Rule No. 8.

Answer 10 (*M*)—A one-half horsepower motor attached to a stationary vacuum cleaner cannot in any sense be regarded as a portable device, so that the wires feeding the motor should be installed in a more substantial and permanent manner than resorting to the use of portable cord. The system of controlling the motor referred to in the question does not, of course, comply with the Code as single-pole switches for controlling motors of one-half horsepower are not permissible under section 8*c*. The system of remote control on vacuum-cleaner motors is one that is now commonly used, but we require an additional switch to be installed inside of the motor.

Answer 11 (*E*)—Does not in my opinion conform to Rule 8, Section C, first paragraph.

Answer 12 (*N*)—No. I should require solid-wire construction to the motor, also double-pole switches on the several floors.

Hydroelectric Plants in Georgia.

Among the hydroelectric plants in Georgia of the Georgia Railway & Power Company and affiliated corporations, are the following:

The Chestatee plant, near Gainesville, is the oldest of these plants, having been built in 1902. It has a capacity of 1200 kilowatts and produces 4,000,000 kilowatt-hours per year. The Dunlap plant, also near Gainesville, has a capacity of 2200 kilowatts and produces 9,000,000 kilowatt-hours a year. The Morgan Falls plant, nearest to Atlanta, has a capacity of 10,500 kilowatts and produces 40,000,000 kilowatt-hours a year. The big Tallulah Falls plant, built in 1913, has a capacity of 60,000 kilowatts and produces 165,000,000 kilowatt-hours a year.

Rates Raised at Carlisle, Ky.

An increase of five cents on the kilowatt-hour charge has been allowed to the Carlisle, Ky., Electric Light & Power Company, by a three to two vote of the City Council. The company some time ago represented to the city that unless the increase was permitted it would be unable to continue operations. A clause in the new contract provides that it may be terminated by the city at any time on a month's notice.

BOOK REVIEWS

"Electric Measurements in Practice." By F. Malcolm Farmer. New York: McGraw-Hill Book Company, Inc. Cloth, 359 pages (6x9 inches), 230 illustrations. Supplied by the Electrical Review Publishing Co., Inc., for $4.00.

"The subject of electrical measurements has received much attention in the literature of electrical engineering. In general, however, the treatment has been from a theoretical or academic point of view. In this volume the author has endeavored to present the subject in a simple, practical manner and from the standpoint of engineers who are actively engaged in making measurements, tests, and investigations in the electrical industry."

Such is the proposed purpose of the book, but the reviewer is considerably at a loss to determine exactly what the author means by theoretical or academic as contrasted with the practical or, rather it is difficult to determine in what way the book is of especial service to "those actively engaged in making tests in the electrical industry."

The author evidently divides the users of books on electrical measurements into two groups, students and practitioners. If we accept this classification as correct, then it seems to the writer that books intended for these groups should have certain definite, or, at least, prominent characteristics. The book intended for the student should contain sufficient sound theory to enable the student to understand the principles involved, and this theory should further be made real by practical illustrations. The illustrations need not be numerous or elaborate, but a point of contact between theory and practice should be clearly and definitely established.

On the other hand, the person actively engaged in making measurements is supposed to know the theory, or the why of the operation, but needs specific and detailed information concerning the technic of making reliable measurements. The practitioner when he is compelled to seek information in a book is usually in search of concrete instruction concerning the best method of putting theory into practice, and the limitations of both theory and apparatus.

When the book before me is reviewed from this viewpoint, it is somewhat disappointing, at least the reviewer was disappointed, for judging from the title and preface he expected to see a book in which the technic of electrical measurements was clearly set forth.

To understand, somewhat, the cause of this disappointment one may refer to Art. 24 in which is described the ballistic galvanometer and the method of determining its constant. The author says, "The constant k is determined with a standard condenser or mutual inductance." No suggestion is given that the condenser and mutual inductance will not give the same constant unless certain corrections are made. Unless the limitations under which the apparatus operates are clearly pointed out, the statement has no "practical" value.

Then, again, several different methods of making magnetic measurements are described, but practically nothing is said about the difficulties encountered in the use of the different instruments, nor are any data given to enable the man who may desire to make some magnetic measurements, and who is not already skilled in the use of apparatus to determine the reliability and accuracy of the methods. It seems to the writer that this is the information that a practical man particularly needs.

The reader must not conclude from the above that the book is without merit. Such a conclusion would be far from the truth. The book contains descriptions of all classes of electrical measurements that an engineer is ordinarily called upon to make together with a brief treatment of the apparatus used. The book is full of very valuable information and data, and, hence, will be useful to any one engaged in electrical testing, but its usefulness is not as great as it might be.

C. M. JANSKY.

"The Principles of Electrical Engineering and Their Application." Vol. I. By Gisbert Kapp. New York: Longmans, Green and Company. Cloth, 356 pages (5½ x8½ inches), 175 illustrations. Supplied by Electrical Review Publishing Company, Inc., for $4.25.

Those who are familiar with Professor Kapp's writings will welcome the production of his two volumes on "The Principles of Electrical Engineering and Their Applications," the first volume of which, dealing with principles, is now available and takes up the following subjects: Conductors; Measurement of Resistance; Potentiometric Measurements; Applications of Ohm's Law; Distribution of Continuous Currents; Testing of Insulation Resistance; Elementary Electrostatics; Applied Electrostatics; Magnets; Electromagnetism; Elementary Electrodynamics; Units; Electromagnetic Measurements; Practical Tests of the Magnetic Qualities of Iron; Elementary Theory of Alternating Currents. The subject of resistance measurements is discussed in such a way as to bring out the limitations of the various bridges and potentiometers including the Thompson bridge so much used now in practice for low-resistance measurement. In the chapters on electrostatics there is the usual discussion of potential and capacity after which formulae are derived for various standard forms of condensers such as parallel cylinders, also for the stress distribution in graded cables and in condenser bushings, the calculus being freely used. The subject of magnetism as developed in most physics text-books would seem to be at fault because the teachers of electrical engineering find that the students' conceptions of magnets, poles and magnetic circuits are not interrelated nor does he understand by what process of juggling the quantity called intensity of magnetization disappears in engineering problems on the magnetic circuit. In Prof. Kapp's book the viewpoints of the physicist and of the electrical engineer are combined so that the book can be thoroughly recommended to anyone who has difficulty in linking up his physics and his electrical engineering studies, to the graduate who wishes to review his fundamental principles, and to the student of electrical engineering as a book of reference. It is rather too specialized to suit the needs of the average non-electrical student unless indeed he is anxious to have in his library a few choice texts on electrical subjects.

Increase of Motor Service at Stockton.—The Holt Manufacturing Company, which is being served electrically by the Western States Gas & Electric Company, at Stockton, Cal., has increased its requirements by 150 horsepower in motors. The company is also supplying an additional 75 horsepower for the Stockton Fire & Enamel Brick Company, the total electric load of this plant now amounting to 255 horsepower in motors.

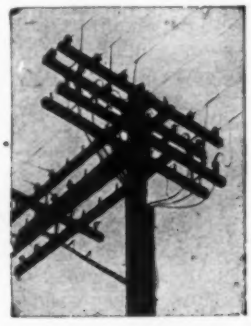
Electrical and Power Appliances

A Review of the Latest Development and Information Respecting Electrical and Kindred Mechanical Appliances

G. & W. Disconnecting Potheads.

On overhead lines there are many points in which it is desirable to insert some sort of disconnective device for sectionalizing the distribution system. The object of this is to permit the system to be operated in sections normally, so as to limit disturbances, and if difficulties such as short circuits, grounds or the like develop, it is desirable to have available means for connecting adjoining sections together, during the period of emergency at least. By this means any interruptions in service can be quickly remedied through such emergency connection.

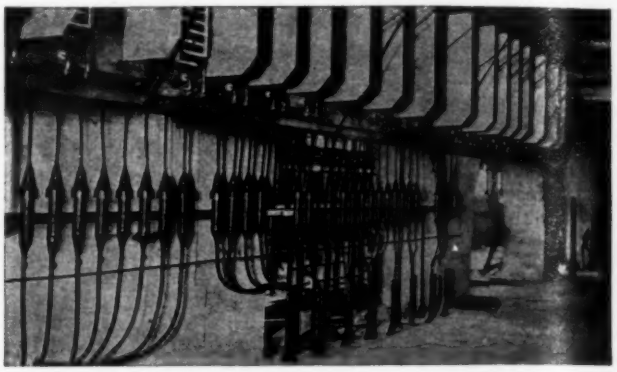
G. & W. Type S Pothead for 6600 Volts.



Typical Cable Pole Equipped With G. & W. Type S. Potheads.

This matter has been given special study by the G. & W. Electric Specialty Company, 7440 South Chicago Avenue, Chicago, Ill. The type S disconnective device illustrated herewith to meet this situation was designed primarily as a pothead. Being easily disconnected, this device is especially suited for such emergency work that involves changing from one feeder to another in the shortest possible time. The type S pothead can be installed by any lineman in a very short time. It is very simple and is low in cost, so that it is very well adapted for installations at any point where some form of disconnective is desired.

On one of the largest central-station systems it is used very extensively, both on overhead lines and as a disconnective on underground cables. It is installed either on cable terminal poles or in manholes. Use of this device has been proven very valuable. Its construction is such that it can be submerged in a flooded manhole almost indefinitely without interrupting continuity of service. These potheads are made for voltages up to 30,000 and in three different forms, provided with wiping sleeves, stuffing boxes or plain entrances for the cable. The latter is the standard type and consists of a porcelain reducer to be taped to the cable. This reducer has a rubber sleeve around the portion that is inserted into the bottom of the tube. The porcelain cap, which fits over the top, has ample overlap to exclude water. It carries a copper plug, which is attached to the outgoing terminal. To open the circuit requires merely removing and replacing the cap, no tools being required for this purpose. By means of this device it is not necessary to cut cables or unscrew any nuts. Its use saves the expense and trouble connected with installing a disconnective box or switch.

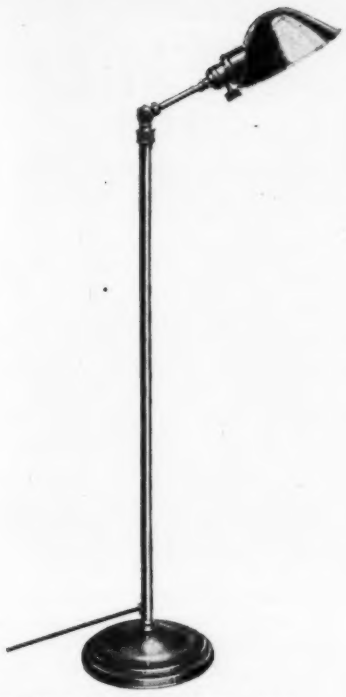


Installation of G. & W. Potheads on Series Lighting Circuits. Spare Regulators Can be Cut in on Any Circuit.

A New Design of Portable Lamp.

A new line of portable lamps has been put on the market by Western Electric Company. In design these lamps have numerous exclusive features, and are attractive in finish. Accompanying illustrations show the floor lamp and table lamp, which may be adjusted to the many positions required in the use of portable lights. These lamps are finished in verde antique, a delightful shade of green. The reflector is designed for the even blending rays of light within a proper radius. The base is 8¼ inches in diameter, and heavily weighted; the cord enters at the bottom of the hollow brass tubing, concealed therein. The connection between the vertical standard and reflector arm consists of a split-ball joint, this arm being held at any angle desired by a thumb screw. The reflec-

Portable Desk Lamp.



New Design, Portable Floor Lamp.

tor may also be adjusted to concentrate the light in any required direction.

Coal-Handling Costs Reduced by Use of Automatic Truck Loader.

The American Optical Company, Southbridge, Mass., being confronted with the problem of loading coal from its ground storage pile by other means than hand shovelers, found a solution by utilizing a Link-Belt wagon and truck loader. This machine loads the material at the rate of one ton per minute and requires but one man for operating, thereby cutting down the operating costs. The company's situation was a peculiar one in that the coal storage pile was some distance from the power house, and thus required transportation and transferring of coal before it reached the boilers. The truck is kept going constantly, as it requires only a few minutes to load it.

The bituminous coal is received by the carload and is dumped from the trestle to the ground storage pile. It is then loaded into trucks by the Link-Belt loader for transportation to the power house, where it is again transferred and fed to the automatic boiler stokers.

The automatic loader, herewith illustrated, is operated by an electric motor and loads the truck shown beside it in about 5 minutes. With the use of this machine the costs of handling coal and gravel have been reduced over 50 per cent., and the same machine is also used in the sand bank, with good results. It enables the company to handle in one day as much as was formerly handled in two days. Not long ago the loader loaded 80 cubic yards of earth which was carried one-half mile by a two-ton truck in one day.

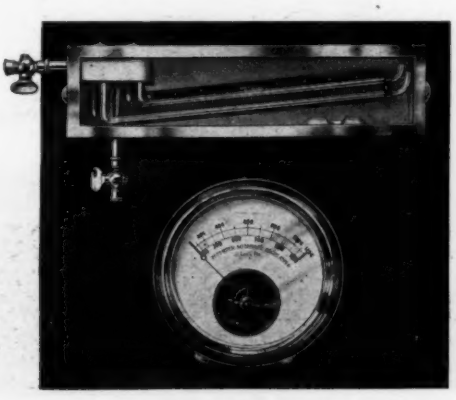
Link-Belt Electric Truck Loader at Work.

Automatic Draft and Flue-Gas Indicating Instruments.

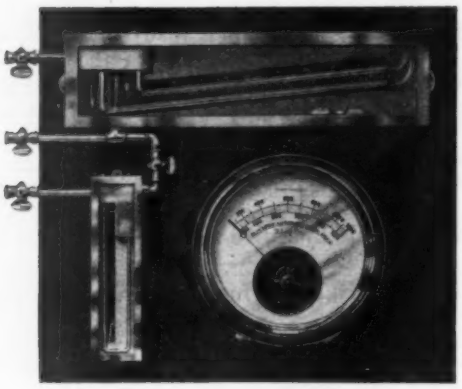
The importance now attached to efficiency in the power plant and especially in the boiler room involves the installation therein of reliable indicating instruments, so that the operator can determine at all times what the conditions of the furnace actually are. The former method of firing a boiler indiscriminately is rapidly giving place to scientific firing and furnace control. Several instruments are highly advantageous for use in this connection. One is a steam-pressure gauge. Another is a dependable draft gauge. Still another is a pyrometer to indicate the temperature of the flue gases.

This matter has been given much attention by a steam specialist, who has produced a considerable variety of boiler control boards equipped with more or less complete sets of these instruments, according to the requirements. The instruments are the invention of William Kemp and are manufactured by the Defender Automatic Regulator Company, St. Louis, Mo. Only two of them are illustrated in the accompanying views, of which the first shows a control board for natural draft. This includes a single-chamber, duplex or multiple-draft gauge and a long-distance electric pyrometer for recording the flue-gas temperature. The pyrometer is the round instrument in the lower portion of the board. The draft gauge can be arranged for connection from either the left or right hand. In the second illustration is shown a control board for forced draft or boilers fired with underfeed stokers. It will be observed that this board has connected with the ordinary draft gauge a direct-reading vertical gauge in the lower left corner, connected by means of a pet cock with the tube that connects with the space directly over fire. Upon opening this cock the vertical gauge reads the differential draft through the fuel bed.

In other boards the equipment is either more or less complete than that shown. In some of them a steam gauge is placed at the top. The company also funishes portable draft gauges especially suitable in



Boiler Control Board for Natural Draft.



Boiler Control Board for Forced Draft.

making boiler tests, stationary and portable flue-gas analysis apparatus of the Orsat type, automatic damper regulators, steam-pressure regulators, etc.

COPES REGULATORS EFFECT ECONOMIES IN MANY IMPORTANT STATIONS.

Detroit Edison Company Uses 79, Public Service Electric Company 20—Other Large Orders.

That many of the important steam-electric generating stations of the country are cognizant of the importance of scientific boiler-feed regulation is indicated by the rapidly increasing installations of feed-water regulators of a type that automatically permits of the feeding of the proper amount of water with reference to load and steam conditions. In a survey recently made of principal central-station plants all were equipped with regulators and their importance as an adjunct to efficient operation emphasized by the operators.

Recent installations made by the Northern Equipment Company of Erie, Pa., manufacturer of the Copes regulators and governors, in some of the largest power plants, are indicative of the trend of the times.

The orders for Copes regulators placed by Detroit Edison Company, Detroit, Mich., have been coming in to Northern Equipment Company since June, 1912, and up to March, this year, 79 of that type had been installed. The largest order from the Detroit Edison was for 22 of 2½-inch size in June, 1913. The sizes used mostly were the 2½-inch, 3-inch, and 4-inch, and three of them were 6-inch size.

The 82 Copes regulators ordered by Public Service Electric Company, Newark, N. J., since August 1, 1915, are not less interesting, as demonstrating the recognition of automatic regulators. Included in these orders were orders on August 1 and December 18, 1915, and July 3, 1917, each for eight 3-inch regulators, which were for 1250-horsepower cross-drum Babcock & Wilcox boilers in the company's Essex station. In this installation there are two Copes regulators on each of the 12 boilers, each regulator feeding to one end of the drum. The fifty 2½-inch regulators ordered February 12, 1917, are in its Marion station; and the eight of 3-inch size, ordered April 2, 1917, are used for plants at Burlington, N. J.

The Consolidated Gas, Electric Light & Power Company, Baltimore, appears as a user of 36 of these regulators, installed since 1914. The largest order was for 12 Copes of 3-inch size on July 12, 1917. The Buffalo General Electric Company has two of these regulators for each boiler, installed similarly to those of Public Service Company's Essex station. This company is also using Copes pump governors. The boilers of Minneapolis General Electric Company are equipped in a similar manner.

Boston Edison Company's boilers now in use and the new Babcock & Wilcox cross-drum boilers being installed all have Copes feed-water regulators, and their pumps are equipped with Copes governors. The record of repeat orders for this or any other kind of equipment is of itself the best evidence of satisfactory use. The meeting of this kind of a test is what gives stability to the machinery and equipment business.

Control Desks for Electrically Operated Switchgear.

The increase in the use of electrically operated switchgear due to the installation of large-capacity power plants during the last few years has resulted in a corresponding increase in the use of control desks for mounting the required controllers, instruments and relays. Because of the variety of conditions they are required to meet, these desks do not lend themselves well to standardization, and practically every desk is built to suit the particular conditions it must meet.

In general, control desks, as built by the large manufacturers of switchboard apparatus, are sectional in form, each section being a unit in itself corresponding to the panel of a switchboard. They may be divided into three broad classes, depending on the provision made for mounting instruments, as follows:

(1) A plain flat desk having no provision for instruments.

(2) A desk with an instrument frame mounted on posts on the rear.

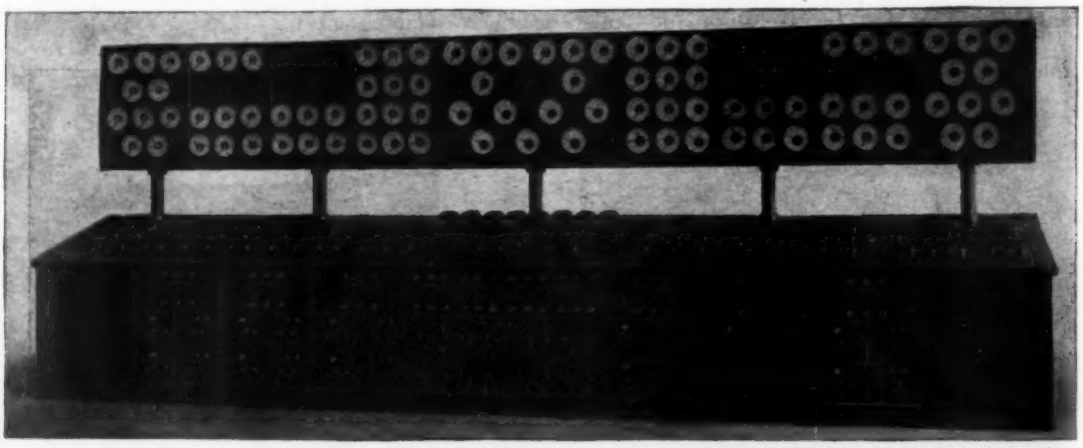


Fig. 1.—Typical Modern Westinghouse Linear Control Desk With Instrument Frame Mounted on Rear.

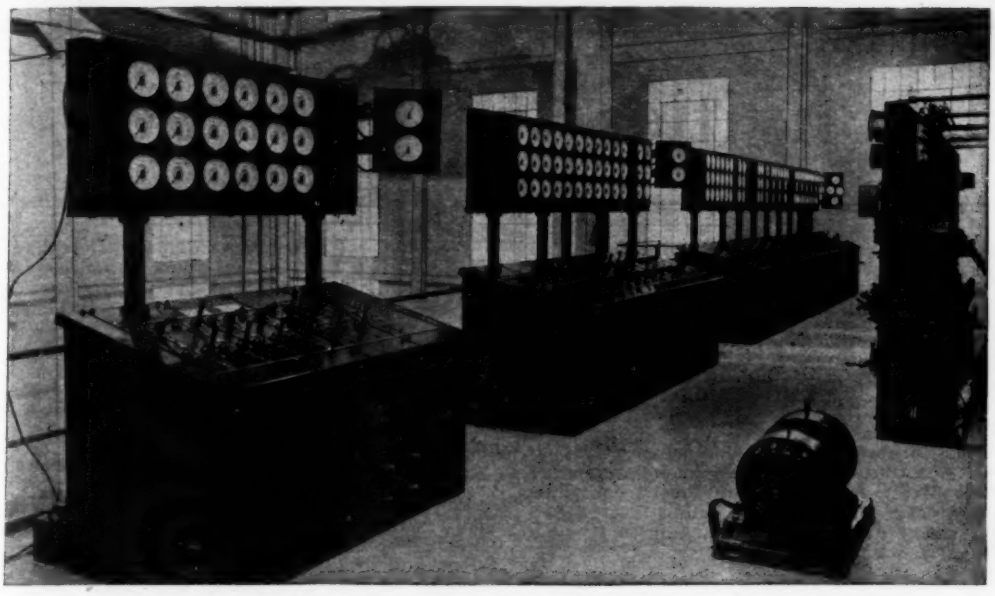


Fig. 2.—Installation of Westinghouse Control Desks for Large Generating Station.

(3) A desk with an instrument section extending upward from the rear edge of the desk top without any intervening space.

Any of these types are made either linear or circular to meet local installation conditions. The linear form is best adapted for use where a small number of circuits are employed; for a large number of circuits the circular desk is more desirable, as it permits a uniform view of all sections of the desk from one central position.

A typical modern linear desk of the type having an instrument frame mounted on the rear, manufactured by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is shown in Fig. 1. This desk is built up on a pipe framework having a channel-iron base, the design being such that sections can be easily added to an existing desk by removing one or both end sections and without disturbing apparatus already installed. The top sections are of slate or marble and the sides of steel. Access to the desk for wiring is afforded either from the rear or sides by means of cover plates which are easily removed.

A difficulty is sometimes encountered in control desks due to the heat generated by the current in the interior, and some means of ventilation is usually provided. In the Westinghouse desks this is taken care of by the simple expedient of providing holes in the steel back.

Modern control desks are frequently provided with a set of signaling devices on the generator sections, whereby the switchboard operator may keep in direct communication with the generator room when starting up and connecting in an idle generator or when shutting down a running machine. These signaling devices are duplicated, one set being at the control desk and the other in the turbine room. The outfit usually consists of from four to six indicating lamps, with flush-type push buttons and suitable legends, either on the lenses of the lamps or on the push-button face plate.

A modern installation of Westinghouse control desks is shown in Fig. 2. The desks are located in the gallery of the station in such a manner as to give the operator a clear view of the machines.

New Pony Type Snap Switches.

New "pony" type snap switches are being made by the General Electric Company, Schenectady, N. Y., with the standard "pony" size base but equipped with porcelain covers and handles so that the switches can be used in exposed places where they are liable to be subjected to corroding influences. These new snap switches are made in single-pole type and rated 3 amperes, 250 volts, 5 amperes, 125 volts, with both closed and slotted bases, as desired, and in indicating or non-indicating types.

New Style Locking Lamp Guard.

A new style of lamp guard, known as Flexco-Lok, manufactured by Flexible Steel Lacing Company, Chicago, is shown herewith. It serves as a safeguard against accidental breakage and makes the lamp secure against theft. The guard may be opened with a key. It is made in sizes to fit all sockets.

These guards have been found very valuable in all places where pendent and extension lamps are used, and their cost quickly pays for itself.

New Lamp Guard.

Activities in the Trade

Western Electric Company, Inc., has appointed A. H. Bannister sales manager at its Minneapolis branch. Mr. Bannister formerly was sales manager at Omaha, where his place has been taken by M. A. Buehler.

Buffalo General Electric Company, Electric Building, Buffalo, N. Y., has had plans prepared for the erection of a new one-story transformer station, about 40x51 feet. The Buffalo Structural Steel Company, 166 Dart Street, is the engineer.

Killark Electric Manufacturing Company, St. Louis, Mo., represented in Chicago by W. Douglas Woolley, 441 South Jefferson Street, furnishes filing sheets, containing descriptions and prices of Electrolet conduit fittings, bell-ringing transformers, and batteries of a number of types and voltages.

Cooper Hewitt Electric Company, Hoboken, N. J., in a recent publication illustrates the Cooper Hewitt electric lamps for motion-picture studios. Some interesting facts are given relative to the growth and progress of this branch of industry. Views are given, showing the equipment of the typical studio. One of these shows a studio in California, equipped with 236 Cooper Hewitt lamps.

The Pioneer Corporation, 1249-55 West 63rd Street, Chicago, manufactures a variety of luminous specialties, known as "Eradium Articles," by which lights are made to shine in dark places. Included in these are luminous house numbers, push-button switch plates, clock dials, light-finding bulbs and other luminous specialties. The company's literature contains illustrations and descriptions of the complete line.

H. Boker & Company, Inc., 101-3 Duane Street, New York City, has issued in convenient pocket pamphlet form a table showing the cost per hour of current consumed by any electrical appliance at rates ranging from one to ten cents per kilowatt-hour. This table was reproduced in the ELECTRICAL REVIEW of October 13, page 647. Copies of it are obtainable from anyone engaged in the sale of appliances on application to the Boker company.

The Esterline Company, Indianapolis, Ind., has issued bulletin No. 370, briefly describing Esterline graphic efficiency instruments as used by central stations, industrial concerns and isolated plants. These meters are useful for graphic recording of kilowatt power consumption, voltage, maximum demand, speed and other important factors. The bulletin is well illustrated, with views of some of these instruments and installation views showing them in use.

Wirt Company, Philadelphia, publishes a late bulletin, showing a list of resistance units which it is supplying the trade. Its Di-el-ite insulation used in these resistance units is composed principally of quartz, and will stand a volts per mil of thickness, but is not recommended for tion, indoors, will stand, under usual conditions, about 400 temperature of 800 degrees Fahrenheit. Di-el-ite insula- wet places. The requisite data are given in this bulletin for use of buyers.

A. Leschen & Sons Rope Company, St. Louis, Mo., presents a number of expressive pictures of mechanical equipment in Leschen's Hercules. These are views of hoists in connection with building construction, and dredges of drag-line and dipper type used in excavating for drainage and reclamation work, in all of which the Leschen wire rope is used. Another picture is one in which a Leschen cable is used for pulling coal cars up a 23-per cent incline to an unloading trestle.

Spraco Cooling System receives special attention in a recent bulletin issued by the Spray Engineering Company, Boston. Cooling of water used in condensers, water jackets and transformers is effected by spraying through a system of nozzles, making a finely divided spray at low pressure. By evaporating, radiation and convection the cooling is accomplished, the water falling into a pond or reservoir for use again. This system, as compared with the cooling tower, it is claimed, involves lower cost, less power, and greater flexibility.

Anderson Electric Car Company, Detroit, Mich., sends out two small booklets, each unique and suggestive. One of them calls attention to the impending shortage of gasoline for automobiles, due to the fact that consumption exceeds production, and points out the solution in the use of electric energy, as applied in the Detroit Electric, made by this company. The other book, entitled "What We Have to Say About Our Competitors," contains the eloquence of silence on 14 blank pages, except a few modest words about Detroit Electric.

McMeen and Miller, engineers, Monadnock Block, Chicago, are installing a new hydroelectrical unit in the plant of Bend (Ore.) Water, Light & Power Company. This is the third unit to be added to the original plant, since its construction several years ago. The new equipment now being put in, under Mr. Miller's supervision, consists of a 35-inch, couple type Leffel water wheel, 600 horsepower, speed of 225 revolutions; and a 560-kilovolt-ampere, 2300-volt, 3-phase, 60-cycle generator, furnished by Electric Machinery Company, Minneapolis. K. B. Miller, of this firm, is general manager of the Bend company.

Consolidated Utilities Corporation, Chicago, national distributor for the Mathews electric light and power plants, announces that either type of plant, standard or marine, is now available in one, two or five-kilowatt capacity, fully automatic or semi-automatic. The automatic plant has a record of more than four years' successful operation. This plant not only stops automatically, but is self-starting. It will be seen that a plant of this type will protect the battery against being overdischarged or remaining discharged. The new sales campaign provides real dealer co-operation and territory organization along intensive and aggressive lines.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has had reprinted an address made by Harrison P. Reed, of its engineering department, which was presented before the meeting of the Elevator Manufacturers' Association of the United States held in Milwaukee, October 10-12. This address is entitled "Some Unique Features of Electric Elevator Control." The dangers of phase failure and phase reversal are pointed out and how these may be overcome by use of a proper protective device. An alternating-current motor-operated brake, also a two-speed alternating-current elevator motor and controller are described. Many useful tables for wiring elevator motors are also given.

Electric Machinery Company, Minneapolis, has sold motor equipment to the Lincoln Highway Tire Company for installation in its new rubber mills at Fulton, Ill. The equipment comprises a 190-horsepower, 440-volt, 3-phase, 60-cycle, 600-revolutions-per-minute, self-starting, synchronous motor, which is driven through a Cutler-Hammer H-60, 44-inch magnetic clutch-brake, with extensible features, in shape of a flexible coupling. This motor is for driving rubber rolls, which were furnished by William Thorpp & Sons Company, Trenton, N. J. The sale made by Electric Machinery Company includes five induction motors, of one, two, three, 10 and 15-horsepower for drives throughout the plant. Power is to be served by Northern Illinois Utility Company.

Westinghouse Electric & Manufacturing Company Announces Wage Increase.—Another increase in wages for shop employes aggregating nearly $2,000,000 a year has just been announced by the Westinghouse Electric & Manufacturing Company. Effective October 16, all employes observing shop hours, except munition workers, will receive an additional bonus of 10 per cent if they are on a salary or time-rate basis, and of 7 per cent if they are on a piece, premium or task basis. The 20,000 shop employes of the Westinghouse company form one of the most highly skilled organizations in the country. They are also one of the best paid bodies as well, increases granted since the outbreak of the European war now amounting to about 60 per cent of the former average compensation.

Personal and Biographical

JOHN B. PRICE has opened an office at 515 Mercantile Library Building, Cincinnati, O., for the Mechanical Appliance Company, of Milwaukee, Wis.

STEPHEN CRUTE is now president of the Danbury & Bethel Street Railway, and of the Bridgeport & Danbury Electric Railway, Danbury, Conn., succeeding John Sanders.

L. W. HENRY has succeeded Charles O. Warfel as superintendent of the Indianapolis & Cincinnati Traction Company, at Indianapolis. Mr. Warfel is in military service.

A. E. REYNOLDS has been appointed acting general manager of the United Traction Company, Albany, N. Y., succeeding C. F. Hewitt, who recently resigned the managership.

N. NIVER has been made superintendent of all departments of the City Light & Traction Company, Sedalia, Mo. Prior to his promotion he was superintendent of the traction department.

A. G. SIMCOX, until recently assistant superintendent of transportation for the Rockford City Traction Company, Rockford, Ill., has been appointed superintendent, succeeding A. G. Snell, who resigned.

SAMUEL RIEBEL, Summit, N. J., connected with the Commonwealth Electric Company of that city in the capacity of engineer of the power plant for the past fourteen years, has resigned.

CHARLES B. HART, who has been with the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., for the last 12 years, has been placed in charge of the light and power department of the company.

EDWARD R. KELSEY, of Toledo, O., advertising manager of the Toledo Railways & Light Company, recently made an address before the Louisville (Ky.) Rotary Club. He spoke on the theme of "Sacrifice and Service."

I. N. SMITH, who for 15 years has been connected with the Diamond Ice & Coal Company, Charleston, W. Va., has been appointed superintendent of the Charleston Interurban Railroad, succeeding S. M. Gallaher, resigned.

HENRY L. DOHERTY'S success in creating and operating public utility projects is treated of in a sketchy and analytical way in the October issue of *American*. This magazine illustrates the story with a full-page portrait of Mr. Doherty.

CRAD BRAZL, who has been with the Arkansas Valley Railway Light & Power Company's auditing department for five years, has been appointed auditor of the Ottumwa Railway & Light Company, succeeding George F. Storms, resigned.

GEORGE BUTTRICK has accepted the position of superintendent of line construction for the Republic Railway & Light Company, Youngstown, O. He formerly was superintendent of overhead for the Bridgeport division of the Connecticut Company.

R. G. BERLE, of the Los Angeles district office of the Westinghouse Electric & Manufacturing Company, is now at the company's Chicago district office.

M. H. HALLENBECK, of the Dallas (Tex.) district office of the Westinghouse Electric & Manufacturing Company, was recently transferred to the Albany office of the company.

W. H. BRAMMAN, formerly with the American Carbon & Battery Company, is now connected with The Walter A. Zelnicker Supply Company, St. Louis, Mo., as assistant to the president.

C. P. GROSS, who retired as superintendent of the Municipal Electric Light and Water plants at Grand Rapids, Wis., has gone to Kansas City, Kans., where he assumes charge of the Municipal Electric Light plant.

GEORGE W. ROOSA recently became a member of the sales force of the Westinghouse Electric & Manufacturing Company at the Buffalo district office. Mr. Roosa formerly was in the supply department at East Pittsburgh.

A. W. MCLIMONT has been appointed manager of the Winnipeg Electric Railway, Winnipeg, Manitoba, succeeding Wilford Phillips. Mr. McLimont has filled many responsible positions with traction and electric companies.

HENRY B. DATES, professor of electrical engineering in Case School of Applied Science, Cleveland, O., contributes to *Engineering Education*, Lancaster, Pa., an article on the "Preparation of Engineering Students for Army Service." It appears in the September number.

M. W. KIRKWOOD has been appointed general manager of the Galt, Preston & Hespeler Street Railway and the Lake Erie & Northern Railways, Galt, Ont. Prior to this promotion Mr. Kirkwood was superintendent for both these lines and in his new capacity succeeds the late Martin N. Todd.

M. N. WEEKS has been made superintendent of the Municipal Electric Light and Water plants at Grand Rapids, Wis. Several years ago Mr. Weeks went to Grand Rapids from Wausau, taking charge of these plants and rebuilding them with new lines, poles, etc., and greatly improving the service.

WILLIAM S. RICHART is now electrical engineer of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., succeeding E. S. Myers, who recently took charge of the Vicksburg Light & Traction Company, Vicksburg, Miss. Mr. Richhart has served in many responsible capacities in the electrical field.

E. IRVINE RUDD, of Glenbrook, Conn., has been appointed engineer of the Public Utilities Commission of Connecticut during the absence of John F. Trumbull, who has been commissioned captain in the Engineering Corps. Mr. Rudd is experienced in railroad, electric railway and contracting work, and for the last four years was assistant engineer with the Central Railroad of N. J.

ELLIOT REID, advertising manager, Westinghouse Lamp Company, New York City, contributed an article to *Associated Advertising*, which appeared in a recent issue, on methods of securing the good will and co-operation of architects in the matter of providing sufficient lighting facilities for buildings and plants.

F. J. MAXWELL has resigned as auditor of the Eastern Wisconsin Electric Company and will enter business in Milwaukee, Wis. He will be succeeded by William E. McGovern, who has been assistant auditor of the Wisconsin-Minnesota Light & Power Company at Eau Claire, Wis., which company is owned by the same interests that control the Eastern Wisconsin Electric Company.

H. D. FEUERS, who has been general manager for Fremont Gas, Electric Light & Power Company, Fremont, Neb., has been transferred to a similar position with City Light & Traction Company, Sedalia, Mo., succeeding S. B. Ireland, who was transferred to the Doherty property at Montgomery, Ala. A. B. Wynne, superintendent of the Mansfield (O.) Electric Light & Power Company, goes to Fremont as general manager.

A. M. LYNN has resigned as president and general manager of the Birmingham (Ala.) Waterworks Company and severed his connections in a like capacity with all other companies controlled by the American Waterworks & Electric Company, to accept the presidency of the West Penn Railways Company. He will now make his residence in Pittsburgh, Pa. The West Penn company besides operating street-car and interurban electric lines, operates electric lighting and water-power plants in many cities in the Pittsburgh district.

Obituary.

JOHN C. WELCH, foreman of the electric engineers of the New York, New Haven & Hartford Railroad, died October 7, at Stamford, Conn.

GENERAL H. N. CHITTENDEN, U. S. A., retired, died in Seattle, October 9. He was an engineer, and a member of the Seattle Port Commission during an active construction period. He was the author of a series of articles on port improvements.

JOHN HOWARD HALE, Glastonbury, Conn., a member of the State Public Utilities Commission, died October 12, in his sixty-fifth year. Mr. Hale was one of the foremost horticulturists in the country and was formerly president of the American Pomological Society.

PERCY LOW COBB, Washington, D. C., an electrical engineer for the last year associated with the Interstate Commerce Commission, Division of Valuation of Railroads, died at Portland, Me., October 11, of typhoid fever. He was a graduate of Stevens Institute of Technology, and at one time connected both with the New York, New Haven & Hartford and Pennsylvania Railroads as instructing electrical engineer.

Men in Government Service

Items of Interest Concerning Power and Electrical Men Who Have Joined the Colors

J. P. LEAF, civil engineer, Rochester, N. Y., has entered the National Army.

HARRY HAGEMAN, Fort Wayne, Ind., engaged in electrical work, has joined the National Army and is reported at the front.

O. A. VOEPEL has entered Government service, having resigned as master mechanic of the Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.

JAMES FENTON, manager of order department for Meadows Manufacturing Company, Pontiac, Ill., is now in army service, with Company K, 349th, Camp Dodge, Iowa.

GORDON RICHARD PAXTON, an employe of Findlay Electric Porcelain Company, Findlay, Ohio, is in military service, being now in training at Camp Sherman, Chillicothe, Ohio.

THOMAS N. MEHAN, Mason City, Ill., for seven years a traveling salesman for Electric Appliance Company, Chicago, was recently commissioned first lieutenant in Signal Corps of the National Army.

JOSEPH A. BUSSMANN, secretary and superintendent of Bussmann Manufacturing Company, St. Louis, Mo., recently entered military service, and at present is mess sergeant at Camp Funston, Kansas.

HAROLD C. OSBORN, an employe of McMeen & Miller, engineers, Monadnock Block, Chicago, enlisted in naval service some time ago. He has an appointment as first class electrician, and is reported "somewhere in France."

R. W. DAVIS, formerly assistant to the sales manager of the National Lamp Works at Nela Park, Ohio, has been appointed chief electrician on one of the United States battleships, and has left Cleveland for "somewhere on the Atlantic coast."

AL. TERRY, assistant secretary of the Chicago Mica Company, Valparaiso, Ind., has joined the Officers' Reserve Corps at Fort Benjamin Harrison.

JOSEPH STIRNI, formerly an electrician at Fort St. Philip, La., is now a second lieutenant in the army, for the present at Jackson Barracks, Louisiana.

GEORGE N. BROWN, formerly electrical engineer for the New York State Railways, Syracuse lines, is serving as first lieutenant in 303rd Engineers' Regiment, at Camp Dix, New Jersey.

ANDREW S. MACREADIE, superintendent of Cape division of Cumberland County Power & Light Company, Portland, Me., now a captain in Quartermasters' Reserve Corps, has been assigned to Camp Dix, New Jersey.

D. J. MCGRATH, special assistant to President M. C. Brush of the Boston Elevated Railway, has received a commission as first lieutenant in Sanitary Corps, U. S. Reserves. He is now engaged in the production of gas masks. Lieutenant McGrath is widely known in electric railway circles.

AMBROSE MONELL, president of the International Nickel Company, tendered his resignation to accept a commission as colonel on the staff of the commander of the American aviation forces abroad. Mr. Monell plans to reach France about six weeks hence, he said. The directors of the company will meet Monday to consider his resignation.

J. D. KENT, electrical engineer for the Union Railway and other roads controlled by the Third Avenue Railway, New York City, has resigned, and is now captain in Engineer Officers' Reserve Corps. Captain Kent is an electrical man of recognized ability, and has contributed some noteworthy articles to the technical press on various types of overhead-line maintenance motor trucks.

J. D. ZOOK, JR., son of J. D. Zook, general superintendent of the Gregory Electric Company, Chicago, has been promoted to the position of chief electrician on United States battleship Arizona. Mr. Zook, junior, studied electrical engineering at the University of Illinois, and later obtained considerable experience with Gregory Electric Company. He enlisted in the Navy two years ago.

EMPLOYEES of Georgia Railway & Power Company, and affiliated companies, have responded promptly to their country's call, a number of them now being in training at Camp Gordon, Georgia. Among those recently entering the service are: Lawrence Hinton, Paul D. Reid, Geo. J. Kollock, C. M. Mayfield, F. W. Wood, Hilliard Poole, R. O. Bowen, E. B. McGee, J. M. Wells, C. A. Brooks, J. D. Sikes, R. S. Raiford, M. T. Singleton, R. E. Tripp, A. T. Beavers and Ben Sale.

CHESAPEAKE & POTOMAC TELEPHONE COMPANY employees, Baltimore, Md., organized last June Company D, 4th Battalion, Signal Reserve Corps, officers of which are: J. Theodore Graff, captain; Charles E. Creecy and Walter E. Ballard, lieutenants; Franklin G. Adams, master signal electrician; George F. Shaw, John N. Bradley, Matthew E. Meier, Leroy L. Collins, sergeants. Company E of this battalion was formed of New York Telephone Company men of Buffalo, Rochester, Syracuse and Albany, with Captain H. E. Brabant in command.

SANGAMON ELECTRIC COMPANY, Springfield, Ill., reports a large number of its employes in Army and Navy service, among them being the following: M. B. Southwick, first called out as captain of Company C of Fifth Illinois Infantry, on guard duty, and is now captain of same company in 143rd U. S. Infantry Regi-

ment, at Camp Logan, Houston, Texas; S. B. Rogers is captain in Quartermasters' Corps, Jeffersonville, Ind.; H. B. Styles is captain of Battery A, Third Illinois Artillery, at Camp Logan; C. G. Lamphier, lieutenant in Quartermasters' Corps, went through the training at Camp Sheridan, and is now at Jeffersonville, Ind. In addition to officers above named, this company has 45 other men in various ranks and positions in Army, Navy and Marine service.

WALTER MYERS, electrician for the Minneapolis Electric & Construction Company, has enlisted in the 135th Minnesota Regiment, and is now with that regiment in New Mexico.

BEARDSLEE CHANDELIER MANUFACTURING COMPANY, Chicago, reports a number of its employes in the National Army, as follows: J. C. Keogh, George R. Gardiner, Otto P. Wohlfahrt, Edward Kuppersmith and Lawrence E. Dicke. Mr. Dicke, the company's assistant superintendent, volunteered, and is a member of Second Battery, Reserve Officers' training camp, Fort Sheridan; Edward Kuppersmith is a volunteer in the Quartermaster's department; the first three named, also volunteers, are in the 108th Regiment, U. S. Engineers, at Houston, Texas.

R. M. ANDREWS, sales manager of the Northern Equipment Company, Erie, Pa., manufacturer of Copes regulators, governors and steam power-plant specialties, has been appointed Aeronautical Engineer in the Aviation Section, United States Government, and reported for duty in Washington, D. C., on October 1. Mr. Andrews is an authority on power-plant efficiency and has contributed important literature on the subject.

UNDERWRITERS' LABORATORIES, 207 E. Ohio Street, Chicago, have for the present parted with a number of employes who are now in national military uniform. Their names and ranks are as follows: H. H. Allport, first lieutenant of Heavy Artillery, assigned to duty in France; R. M. Lucas, captain, at Frankford Arsenal, Bridesburg, Pa.; E. L. Ihrig, sergeant, Infantry, Camp Grant, Rockford, Ill.; W. E. Lucas, first lieutenant, official interpreter on General Pershing's staff, in France; F. F. Palmison, second lieutenant, Coast Artillery; O. L. Robinson, lieutenant, Engineers' Corps, assigned for duty in France: J. E. Ruggles, sergeant-electrician, Coast Artillery, Fort Hamilton, N. Y.; W. G. Tobin, major, Texas National Guard; R. A. Newton, electrician, Aviation Corps, Fort Slocum; C. W. Rulon, electrician, Coast Guard Service, New London, Conn.; and in other branches of the service are: C. Gideon, C. P. Hames, E. A. Jaggle, G. C. Kern, J. H. McLaughlin, A. F. C. Perrin, A. N. Rohr, J. Sheldon, W. T. Wagner, M. B. Wallbank.

CINCINNATI & SUBURBAN BELL TELEPHONE COMPANY, Cincinnati, Ohio, sends us the following list of its employes in military and naval service: Wm. H. Curtin, Thomas L. McLaughlin and Herbert F. Burns, in Heavy Artillery; Robert Schweikert, Norman Bluestein and Willard Cunningham, in 1st Regiment, O. N. G.; W. A. Steward, T. W. Ledwith, Donal R. Grogan, Joseph Nesselhauf, Howard H. Binkley, Joseph C. Sontag, Joseph E. Schmidt, Earle E. Hesse, Wm. Vernke, R. C. Kamphausen, Stanley Phillips and John M. Walsh, all in Company E, Twelfth Telegraph Battalion, Signal Reserve Corps; Joseph Desha, in Navy; Russell T. Teague, in Marine Corps; Joseph E. Bowen, George Schnippel, T. O'Brien, R. J. Moloney, J. Shirra, H. Herbat and R. W. Arnold, in service by selective draft.

ROLL OF HONOR.

The electrical industry, perhaps to a greater extent than any other industry, has answered the call of the Nation for men. As this is a war of engineers, naturally the technically trained men in the electrical industry have been in great demand and they have responded with splendid patriotism. Many of the large utility and industrial corporations have assigned men for Government service aside from those who have voluntarily entered or been called for service.

THE ELECTRICAL REVIEW will *welcome news concerning men who have entered the service or who are engaged in any patriotic duties.*

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY employees are well represented in the several branches of the National Army. More than 100 men of its sales organization have entered the service, many of whom are well known in the electrical industry. Classified with reference to connection with the company's branch offices, their names, with positions and ranks in the service, are as follows: Atlanta—J. B. Law, second lieutenant, Infantry, Camp Gordon, Ga.; W. A. Emerson, R. O. T. C., Coast Artillery, Fortress Monroe, Va.; W. S. Roberts, R. O. T. C. (Infantry), Ft. Myer, Va. Boston—K. H. Leland, R. O. T. C. (Art.), Plattsburgh, N Y.; C. W. Babcock, ensign, Coast Patrol, South Boston. Buffalo—C. W. Thomas, R. O. T. C., Ft. Sheridan, Ill. Chicago—W. E. Davis, first lieutenant, U. S. Marine Corps; E. T. Whiting, first lieutenant, 5th Engineers Corps; H. P. Williamson, first lieutenant, 19th Company, 1st Regiment, U. S. Marine Corps; Thos. Green, lieutenant, Marine Corps; H. L. Brundage, National Army; R. G. Hightshoe, Company 339, Field Artillery, Battery "D," Camp Dodge, Des Moines, Iowa. Cincinnati—George Baily, major, Engineers Officers' Reserve, 308th Engineers, Camp Sherman, Chillicothe, Ohio; C. B. Ketcham, first lieutenant, Indiana National Guard, Company C, Separate Battalion Engineers. Dallas—W. E. Holland, National Army, Chandler, Okla.; R. M. Keck, National Army, Cotulla, Texas. Denver—N. H. Callard, Officers Reserve Training Camp, Presidio, San Francisco, Cal. Detroit—W. H. Sweet, Cavalry Troop, Camp Custer, Battle Creek, Mich.; E. D. Macfarlane, cadet in Royal Flying Corps, Camp Borden, Ontario. New York City—F. W. Carter, first lieutenant, R. O. T. C.; H. G. Wood, first lieutenant, R. O. T. C.; H. A. Philip, first lieutenant, R. O. T. C.; M. N. Oats, first lieutenant, R. O. T. C.; H. A. Darrin, second lieutenant, R. O. T. C.; B. A. Gerry, electrician, Coast Defense; Wm. Edsall, chief electrician, U. S. Navy; W. W. Gibson, Lafayette Flying Squadron, Eleve Pilote, Ecole d'Aviation, Avord (Cher.), France. Philadelphia—C. Hardiman, Unit 1, U. S. Ambulance Corps, "Somewhere in France"; E. V. Freeman, second lieutenant, National Army Cantonment, Louisville, Ky.; E. H. Robnett, first lieutenant, Company E, 306 Reg. Engr., Camp Jackson, Columbia, S. C.; E. A. Hartman, 2nd Regiment, Field Hospital, Camp Hancock, Augusta, Ga.; J. Gauthier, second lieutenant, Company 3, Engineers' Training Camp, American Univ. Sta., Washington, D. C.; J. W. Magee, second lieutenant, Company 3, Engineers' Training Camp, American Univ. Sta., Washington, D. C. Pittsburgh—W. R. Creamer, sergeant, Field Artillery, Camp Hancock, Augusta, Ga.; A. G. Horst, Field Artillery, Camp Hancock, Augusta, Ga.; G. P. McKee, Company F, 18th Penna. Regiment, Camp Hancock, Augusta, Ga.; F. L. Kolb, lieutenant, Marine Reserve Corps, Quantico, Va.; C. T. Lawson, lieutenant Reserve Corps, Quantico, Va.; F. C. Albrecht, Ordnance Officers' Reserve, Frankford Arsenal, Philadelphia, Pa.; C. H. Angell, 3rd Battery, Field Artillery, R. O. T. C., Military Branch, Chattanooga, Tenn. Cleveland—L. E. Knapp, lieutenant, 2nd Depot Regiment, Camp Sherman, Chillicothe, Ohio; S. L. McDowell, 6th Company, Infantry, R. O. T. C., Fort Benjamin Harrison, Indianapolis, Ind. Columbus—E. W. Knight, 3rd Depot Regiment, Camp Sherman, Chillicothe, Ohio; St. Louis—D. H. Lyford, first lieutenant, Engineer Officers' Reserve Corps, Battle Creek, Mich.; H. C. Thomas, first lieutenant, Engineer Officers' Reserve Corps, abroad, address unknown; J. H. Waxman, first lieutenant, Engineer Officers' Reserve Corps, abroad, address unknown; R. S. Hood, Jr., second lieutenant, Engineer Officers' Reserve Corps, 314th Pioneer Engineer Regiment, Camp Funston, Kans., San Francisco—W. C. Johnson, U. S. Training Camp, 5th Company, Presidio, San Francisco, Cal.; F. V. Carleton, U. S. Training Camp, 7th Company, Presidio, San Francisco, Cal.; Elbert Kramer, 184 20th Ave., Richmond District, San Francisco, Cal.; Seattle—Geo. Tripple, lieutenant, Engineers' Reserve Corps, Vancouver Barracks, Vancouver, Wash.

From the general sales office at East Pittsburgh, 15 men have gone into service. E. F. Clark, manager of the condenser section, power department, is at Camp Lee, Va.; R. P. Evans of the supply department, is a captain at Camp Lee.; F. W. Harrison (industrial) is a second lieutenant at Camp Meade; C. H. Kent (industrial) is a first lieutenant at the Engineers' Training Camp near Washington, D. C.; C. G. Lewis (industrial) is a second lieutenant on the same duty; W. R. Maull (railway), W. W. Reddie (industrial) and R. M. Stoddard (industrial) are at Camp Lee.

CAPTAIN ROBERT B. OWENS, widely known in electrical circles for his work at the head of the Electrical Engineering Department of the McGill University, Montreal, and more recently as secretary of the Franklin Institute of Philadelphia, is now at the front in France and is a captain in the U. S. Signal Corps. Captain Owens and General Pershing are old acquaintances, having been associates in Nebraska a good many years ago.

THE LINCOLN ELECTRIC COMPANY, Cleveland, O., has several employees in National Army: H. R. Ward, mechanical engineer, is in training at Fort Benjamin Harrison, Ind.; L. R. Hawk, assistant electrical engineer, is first lieutenant in Ordnance Department; W. H. Noble, district manager, Chicago, is in the Artillery Corps, Fort Sheridan.

Latest Approved Fittings

The electrical fittings listed and described in this department have been approved by the Underwriters' Laboratories, Incorporated, after examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association

Attachment Plugs, Fuseless.—Bryant Electric Company, Bridgeport, Conn.
Separable caps, catalog No. KJ.
Listed August 28, 1917.

Cabinets and Cutout Boxes, Sheet-Metal.—Universal Sheet Metal Works, San Francisco, Cal.
Listed September 4, 1917.

Cabinets and Cutout Boxes, Sheet-Metal.—Charles J. Peterson Company, 723-29 Fulton Street, Chicago, Ill.
Listed September 19, 1917.

Cabinets and Cutout Boxes, Sheet-Metal.—Ashland Electric Company, 1517 Haddon Avenue, Chicago, Ill.
Listed August 15, 1917.

Conduit Boxes, Floor Outlet.—Frank Adam Electric Company, 904 Pine Street, St. Louis, Mo.
Cast-iron, water-tight floor outlet box with floor plates and nozzles, catalog No. F. B. 453.
Listed August 10, 1917.

Cutout Bases, Plug-Fuse.—Trenton Electric & Conduit Company, Trenton, N. J.
Catalog Nos. 1935, 2135, 2165, 2199, 2587, 2965, 8042.
Listed September 7, 1917.

Fitting for Conduit Boxes, Covers.—The Pratt Chuck Company, Frankfort, N. Y.
Stamped-steel conduit-box covers with metal bushed holes for pendent flexible cord. Catalog Nos. B. I., C. D., F. I., M. D.
Listed August 31, 1917.

Fixtures.—Franklin Specialty Manufacturing Company, 195 Rhodes Street, Providence, R. I.
"Anderson" adjustable electric fixtures; ceiling, wall, bench, table, floor, desk bracket and portable types.
Listed July 25, 1917.

Flexible Tubing Fasteners.—Standard Electrical Manufacturing Company, 504 Prospect Avenue, Cleveland, O.
"Standard." For securing flexible tubing in outlets.
Listed August 8, 1917.

Ground Clamps.—Utility Fittings Company, 812 Walnut Street, Philadelphia, Pa.
"Utility" ground clamps for use with 3-inch rigid conduit or less.
Listed September 6, 1917.

Heaters, Air.—Majestic Electric Development Company, 656-8 Howard Street, San Francisco, Cal.
Portable air heaters, consisting of wire-round resistance elements mounted on sheet-metal reflectors and inclosed in sheet-metal casing with screened fronts. 5.6 amperes or less, 110 volts, type No. 9.
Listed August 3, 1917.

Heaters, Air.—Hotpoint Electric Heating Company, Ontario, Cal.
"Hedlite" luminous, 650 watts, 110 volts.
Listed September 29, 1917.

Lamps, Arc.—Atlas Electric Devices Company, 108 South Clinton Street, Chicago, Ill.
Solar determinator for subjecting small samples of dyed cloth to effects of an arc lamp. Equipment consists of arc lamp in portable frame and series rheostat for separate mounting. "Atlas," 220 volts, 30 amperes or less, alternating current and direct current.
Listed July 24, 1917.

Outlet Bushings.—Acme Electric Manufacturing Company, 683 Lorimer Street, Brooklyn, N. Y.
A galvanized-iron plate threads on end of rigid conduit and supports a porcelain cap with three outlets for conductors. D & H Pipe Endlet, ½-inch to 1-inch sizes.
Listed September 21, 1917.

Outlet Bushings.—Utility Fittings Company, 812 Walnut Street, Philadelphia, Pa.
Cast-iron fitting with two conduit entrances at right angles, and having opening for drawing in wires with threaded closure cap.
"Utility" type Y, ¾, 1, 1¼, 1½, 2, 2½, 3, 3½ and 4-inch sizes.
Listed September 11, 1917.

Outlet Bushings, Service-Entrance.—Acme Electric Manufacturing Company, 683 Lorimer Street, Brooklyn, N. Y.
Porcelain fittings having separate openings for the wires, secured to under face of cast-iron cover attached by threaded bushing to rigid conduit. "D & H Electric Service Endlet," ½-inch to 1-inch sizes.
Listed September 22, 1917.

Panelboards.—Charles J. Peterson Company, 723-29 Fulton St., Chicago.
Listed September 19, 1917.

Receptacles for Attachment Plugs, and Plugs.—Trumbull Electric Manufacturing Company, Plainville, Conn.
"Circle T." 660 watts, 250 volts, catalog No. 1005.
Listed September 7, 1917.

Receptacles for Attachment Plugs, and Plugs.—Bryant Electric Company Bridgeport. Conn.
"Bryant" or "Perkins" Spartan, 10 amperes, 250 volts. Caps type KJ.
Listed August 28, 1917.

Resistance Appliances.—Allen-Bradley Company, Milwaukee, Wis.
"Allen-Bradley" motor-starting rheostats, 500 volts or less, type H, forms C, FG.
Listed August 30, 1917.

Signal Appliances, Bells.—Schwarze Electric Company, Adrian, Mich.
"Schwarze," 250 volts or less, catalog No. 22.
Listed August 22, 1917.

Signaling System.—Lucas Signal & Control Company, 230 West Kinzie Street, Chicago, Ill.
Elevator signal system, consisting of contactor mechanism operating to control 20-volt circuit lighting signal lamps at doors to indicate approach of elevator car. Standard conduit system in elevator shaft and to lamp fixtures.
Motor-generator, 125 or 250 to 20 volts.
When installed over other than fireproof shafts, or in immediate vicinity of combustible material, the contacting mechanism and motor should be provided with pans to prevent falling of sparks or molten metal in case of failure of apparatus.
When installed in dusty or linty places, or exposed to flyings of combustible material, suitable inclosures should be provided.
Listed August 2, 1917.

Sockets, Medium-Base. — Crouse-Hinds Company, Syracuse, N. Y
"C-H Co." weatherproof porcelain sockets.
Keyless, 660 watts, 600 volts, catalog No. PE-57.
Listed July 27, 1917.

Switches, Automatic—Clock-Operated Type.—L. T. Fenning, Jackson, Ohio.
Automatic switch and supporting bracket with clock mechanism, equipped with operating cam and contact strips, and designed to close and open a circuit at predetermined intervals.
"Fenning." Double-pole, 5 amperes, 250 volts, 10 amperes, 125 volts.
Listed September 7, 1917.

Switches, Fixtures.—Benjamin Electric Manufacturing Company of Canada, Ltd., 11-17 Charlotte Street, Toronto, Ont.
"C-H." Single-pole. Pull, catalog Nos. 7300, 7302, 7304, 7306-08 inclusive, 7311-17 inclusive.
Listed July 21, 1917.

Current Electrical News

WEEKLY RECORD OF CONSTRUCTION ACTIVITIES

EASTERN.

RUTLAND, VT.—Rutland Railway, Light & Power Company is planning for the immediate construction of a transmission line from Castleton Corners to Hampton, a distance of about six miles, for the purpose of supplying the Staso Milling Company with power to the amount of 2400 horsepower. The company has also secured a contract from the Patch Manufacturing Company for furnishing service to the amount of 335 horsepower.

BOSTON, MASS.—Standard Oil Company of New York has commenced the erection of a one-story power house, about 36x60 in Chelsea street, East Boston.

BROCKTON, MASS.—Hub Gore Company has awarded a contract to the Tremaine Electric Company, School street, Brockton, for the installation of electrical equipment in its new factory on North Warren avenue.

NEW BEDFORD, MASS.—Union Street Railway Company, Purchase street, has awarded a contract for the construction of a power station, about 80x115 feet in Middle street, to cost about $66,000. The structure will be of brick, concrete and steel. Henry M. Hope, 185 Devonshire street, Boston, is the engineer.

WORCESTER, MASS.—Worcester Electric Light Company, 37 Main street, has awarded a contract for the construction of a three-story and basement substation, about 53x73 feet, near Grafton street, to cost about $30,000. E. J. Cross Company, 82 Foster street, Worcester, is the contractor.

ALBANY, N. Y.—Esco Electric Supply Company has announced an increase in its capitalization from $10,000 to $100,000 for expansion.

BINGHAMTON, N. Y.—Binghamton Light, Heat & Power Company has secured a contract from the United Shoe Machinery Company for supplying power to its works, consisting of 45 horsepower in motors, one 10-kilowatt tempering bath, two large electric welders, and 30 arc furnaces. The new plant of the company is now operating regularly, and rapid progress is being made in the construction of the new substation.

BROOKLYN, N. Y.—New York Municipal Railway Corporation, 85 Clinton street, has had plans prepared for the erection of signal towers, circuit breaker houses, etc., at its Coney Island Terminal. W. S. Menden is chief engineer for the company; T. S. Williams is president.

NEW YORK, N. Y.—Electric Bond & Share Company, 71 Broadway, has leased two entire floors of the new building at 65 Broadway erected by the American Express Company to provide for expansion.

NEW YORK, N. Y.—Western Union Telegraph Company, Lispenard-Walker Building, has leased two floors in the Vincent Building, 302 Broadway, for extensions in its service departments. The lease is for a period of five years, at an aggregate rental of approximately $60,000.

NEW YORK, N. Y.—Radium Luminous Material Corporation, 55 Liberty street, has filed notice of an increase in its capitalization from $1,500,000 to $2,100,000.

NIAGARA FALLS, N. Y.—Public Service Commission has advised that it will hand down an order within a few days, authorizing the Niagara Falls Gas & Electric Light Company to issue bonds, probably to the extent of $300,000, for proposed building of a modern gas plant and extension to mains to various parts of the city.

OLEAN, N. Y.—Board of Water Supply is having plans prepared for the construction of a new filtration plant, including a one-story brick pumping station to have a capacity of 2,500,000 gallons daily, to cost about $75,000. William Sheehan, City Hall, Commissioner.

ROCHESTER, N. Y.—Bridgeport Machine Tool Corporation, Clinton Road, has had plans prepared for the erection of a new one-story and basement heating plant. Robert S. Byers, 421 Chamber of Commerce Building, Rochester, is architect.

ROCHESTER, N. Y.—General Railway & Signal Company, Lincoln Park, is planning for the construction of a power house at its plant.

SYRACUSE, N. Y.—City Commission is planning for extensive improvements in its electric street-lighting system.

SYRACUSE, N. Y.—Jordan Electric Light & Power Company has filed notice of an increase in its capitalization from $25,000 to $35,000 for expansion.

BAYONNE, N. J.—Board of Education has awarded a contract for the immediate installation of electrical equipment in the addition to public school No. 11, just completed at a cost of about $49,000.

CALDWELL, N. J.—Township Committee is planning for the immediate installation of an electric street-lighting system in Fairfield Road, a distance of approximately six miles.

CLARKSBORO, N. J.—Township Committee has commenced the installation of its proposed new electric street-lighting system and rapid progress is being made.

MONTCLAIR, N. J.—Board of Commissioners has commenced the installation of a new "white way" street-lighting system in Bloomfield avenue. New 600-candlepower units are being utilized.

KEARNY, N. J.—Town Council is planning for improvements in its fire alarm system.

NEWTON, N. J.—Town Committee has received a bid from the Newton Electric & Gas Company for furnishing service for its proposed new electric street lighting system at a cost of about $8000 per year.

PERTH AMBOY, N. J.—Public Service Electric Company has awarded a contract to the Terry Construction Company, 607 West Fifty-first street, New York, for the installation of a new steam turbine, generator, condenser and auxiliary equipment at its local power station.

TRENTON, N. J.—John A. Roebling's Sons Company has taken out a building permit for the construction of a one-story brick pumping station on Canal street, near Elmer street.

TRENTON, N. J.—City Commission is planning for the immediate installation of an electric street lighting system from Calhoun street to the Log Basin.

GIRARDVILLE, PA.—Schuylkill Electric Company has been awarded a contract by the borough officials for furnishing service for its street lighting system.

MONT ALTO, PA.—Borough officials are planning for the immediate installation of a new electric street-lighting system. Service will be furnished by the Waynesboro Electric Light & Fuel Company, Waynesboro.

PHILADELPHIA, PA.—American International Corporation is planning for the installation of pumps and air compressors at the local shipbuilding plant to cost about $218,000. At the Bristol plant, the company has commenced extensive improvements and additions, including the doubling of the capacity of the power house, which is now 75x150 feet. It is said that the new equipment to be installed in the power house will cost approximately $1,000,000.

PHILADELPHIA, PA.—Philadelphia Suburban Gas & Electric Company has commenced the construction of a transmission line from Phoenixville to Black Rock.

PHILADELPHIA, PA.—Philadelphia Electric Company has awarded a contract to F. A. Havens & Company, 845 North Nineteenth street, Philadelphia, for the construction of a two-story addition to its power station "R" on Kensington avenue, at a cost of about $20,000.

PHILADELPHIA, PA.—Unit Construction Company has awarded a contract for the erection of a power house addition in connection with its new factory to be constructed at Fifty-seventh and Gray avenues at a total cost of $83,000. John N. Gill & Company, Otis Building, Philadelphia, are the contractors.

PITTSBURGH, PA.—The City has awarded a contract for the construction of a new power plant addition at the Mayview (Pa.) plant to cost about $29,993. The Wilson Construction Company, Fulton Building, Pittsburgh, has the contract for erection.

READING, PA.—Reading Brewing Company is planning for the complete electrification of its plant to cost about $10,000. The Metropolitan Edison Company has been awarded the contract for furnishing power to the works.

SCRANTON, PA.—Maccar Truck Company, Cliff street, has had plans prepared for the construction of a one-story brick and reinforced concrete power

Business is Good

The unique feature in the electrical supply business is that the rising market—in fact, the exceptionally high market—has had no effect upon the demand, or if affected, it has been in the direction of spurring it on to an unusual degree in certain lines of construction and extension work in this territory.—R. Ackerman, Capital Electric Company, Salt Lake City.

house, about 32x42 feet to cost $10,000. Duckworth Brothers, Coal Exchange Building, Scranton, are architects.

BALTIMORE, MD.—Chesapeake & Potomac Telephone Company, Light street, is planning for the erection of an exchange plant at Bel Air, Md. McKenzie, Voorhees & Gmelin, 1123 Broadway, New York, are architects.

CAPE CHARLES, VA.—Hickle Kellog has had plans prepared for the construction of a one-story brick, steel and concrete power house, about 40x43 feet, to cost $10,000.

CHARLESTON, W. VA.—West Virginia Water & Electric Company, 131 Summer street, has awarded a contract for the construction of a one-story addition, about 46x75 feet, to its power plant. The Central Engineering Company, Lee and Dickinson streets, Charleston, is the contractor.

KINGWOOD, W. VA.—Preston County Power Company is planning for extensions and improvements in its system.

RALEIGH, W. VA.—Chesapeake & Ohio Railway is planning for the construction of a power house to cost about $20,000. F. I. Cabell is chief engineer.

WELCH, W. VA.—Solvay Collieries Company is planning for the installation of new power equipment at its Exeter Colliery. Headquarters of the company are at Syracuse, N. Y.

LAWNDALE, N. C.—Piedmont Hosiery Company, recently incorporated, is planning for the installation of electric equipment to cost about $10,000.

WARRENTON, N. C.—City is having plans prepared for the construction of an electric-lighting plant with capacity of about 300 kilowatts. A. G. Elliott is city manager.

CLARKSVILLE, GA. — Wofford Shoals Light & Power Company is planning for the construction of a three-phase transmission line to connect its Clarksville and Cornelia systems, a distance of about 5½ miles. The company is also considering the construction of a transmission line to Lula (Ga.)

ATLANTA, GA.—Chestatee Railway Company has been incorporated with a capital of $150,000, and will build a railroad from Clermont, Ga., to the mines of the Chestatee Pyrites & Chemical Company, about 9¾ miles long. The incorporators are N. P. Pratt, of Decatur; Palmer Pratt and others.

NORTH CENTRAL STATES.

CANTON, O.—Canton & Ohio River Railway Company is being organized with a capital of $1,000,000, to promote the construction of an electric railway from Canton to Wheeling, W. Va. The company is being formed under the laws of Ohio and West Virginia, with Canton, Cincinnati and Cleveland men as organizers.

CINCINNATI, O.—Automatic Electrical Devices Company has incorporated with a capital of $10,000. The incorporators are Clarence E. Ogden, W. N. Simlick, William Katzenberger, O. W. Sharman and D. N. Ogden.

CLEVELAND, O.—Elliott Electric Company has increased its capital from $50,000 to $150,000.

DAYTON, O.—Duriron Castings Company will install a Booth-Hall electric furnace of ¾-ton capacity, for producing its special non-corrosive duriron. Power will be furnished by the Dayton Power & Light Company.

LIBERTY CENTER, O.—Farmers' Mutual Telephone Company's plant has been damaged by fire.

LIMA, O.—Lima Storage Battery Company has incorporated with a capital of $5000. The incorporators are H. W. L. Kidder, F. I. Bayly, H. T. Fletcher, G. F. Bayly and R. E. R. Fletcher.

MANSFIELD, O.—National Electric & Construction Company has incorporated with a capital of $10,000. Frank Mattox, E. P. Robbins, M. A. Drake, A. M. Weldon and Mrs. Ida Robbins are the incorporators.

INDIANAPOLIS, IND.—Interstate Public Service Company, lessee of the Indianapolis, Columbus & Southern Traction Company, has been authorized to issue $41,000 bonds for the purpose of refunding to the treasury of the company, expenditures for betterments and improvements.

CHICAGO, ILL.—Cook County voters will vote on the adoption or rejection at judicial election next month on a $1,000,000 bond issue for the building of a branch county hospital at State and Ninety-fifth streets. Another $1,000,000 issue is for construction of a pathological laboratory in Oak Forest and still another $3,000,000 bond issue is proposed for a new county jail.

DIXON, ILL.—Illinois Northern Utilities Company has bought the Byron light and power plant. The Illinois Northern owns many such plants throughout northwestern Illinois.

GILLESPIE, ILL.—Southern Illinois Light & Power Company is planning to erect a new plant here. The plans are for a very modern plant, adequate for the needs of this city and the surrounding towns. In connection with the plans is proposed an ice plant, if encouragement for same is received. Address J. J. Frey, president, 104 East Second street, Hillsboro.

WAYNESVILLE, ILL.—National Telephone & Electric Company, operating plants at Clinton and Waynesville, will install at Waynesville 7000 feet of underground cable, an up-to-date magneto system and have one of the best small services in its part of the country. Waynesville has granted the company a 25-year franchise. It is expected to complete the work by January 1.

MUSKEGON, MICH.—West Michigan Steel Foundry Company will install a 3-ton Booth-Hall electric steel furnace, capable of producing 30 tons in 24 hours; this is the same size as the furnace of this type put in operation by the Midland Electric Steel Company, Terre Haute, Ind., last year. The furnace at Muskegon will be supplied with power by the Consumers Power Company.

TRAVERSE CITY, MICH.—Boardman River Dam and Spillway here, which was destroyed by fire, will be rebuilt at once. Address W. S. Cooke, manager of the Boardman River Electric Light & Power Company.

DePERE, WIS.—Hockers Company will install a 40-horsepower motor to furnish power for the brick yard plant. The company will light its property by electricity, in order to work at night when necessary. W. H. Phillips has also contracted for power and light.

LADYSMITH, WIS.—An election will be held to decide the question of issuing $10,000 electric lighting plant bonds.

MADISON, WIS.—Marshall Electric Light & Power Company has filed notice of dissolution.

MARATHON, WIS.—Wisconsin Valley Electric Company has applied for franchise to build lines and erect poles in Marathon for the transmission of electric current for heating, lighting and power purposes.

RACINE, WIS.—Electrical Construction Company has increased its capital from $18,000 to $81,000.

STEVENS POINT, WIS.—Frank A. Vaughn, Security Building, Milwaukee, consulting engineer, is preparing plans for an ornamental street lighting system. Specifications include 120 lamps of 100 candlepower and 80 of 250 candlepower.

WAUZEKA, WIS.—Mid-Continental Utilities Company which owns and operates the Boscobel, Fennimore, Galona, Lancaster, McGregor and other electric service stations, has issued and sold bonds for the building of a line from Boscobel through Wauzeka and Woodman to Prairie du Chien and thence into Iowa, where it will connect with other towns. This will give Wauzeka the best of electric service, both as to power and light.

SAC CITY, IA.—City is contemplating erection of a municipal electric lighting plant.

FREDERICKTOWN, MO.—The proposition of selling the municipal light plant was voted upon and failed to carry. It is imperative that considerable money be spent in putting the plant in shape. The matter will come up again at the next meeting.

KANSAS CITY, MO.—Kansas City took a real step toward municipal ownership of the electric light plant, Oct. 8. Council passed an ordinance providing for a bond proposal of $700,000 with which to make a start and also an ordinance providing for a special bond election to be held Jan. 8.

ST. LOUIS, MO.—Business men along Jefferson avenue from Park to Russell avenues will have the co-operation of the Fourteenth Ward Welfare Association in establishing a "white way." More lights will be erected along this stretch. The city has also been asked to put red traffic lights at the intersection of Gravois and Jefferson avenues.

ARMA, KANS.—Kansas Gas & Electric Company for a period of 20 years has been granted right to use certain streets and alleys to lay pipes or conduits, erect poles, etc., necessary to install, operate and maintain an electric power and distributing system.

CHANUTE, KANS.—Chanute is confronted with the proposition of enlarging its electric light plant or giving poor service. The plant now is carrying about 40 per cent overload.

FORT RILEY, KANS.—Plans are being made for enlarged electric light plants at Fort Riley and Camp Funston.

INDEPENDENCE, KANS.—A petition asking for a white way through the business districts of the city was filed with the city commissioners Oct. 4, and was referred to City Attorney McVey.

NORTON, KANS.—A new $12,000 engine for Norton's Municipal light plant will be installed soon.

PROTECTION, KANS.—Electric lighting plant here was recently badly damaged by fire; loss $25,000. The water power plant nearby was saved. The city had voted bonds for a new plant but work had not been started.

TOPEKA, KANS.—Wichita, Walnut Valley Interurban system may build to Topeka and the attorney is asking permission to sell $2,000,000 worth of stock in the new enterprise. The new lines proposed would tap rich sections without railway advantages and connect with a network of electric lines.

BONESTEEL, S. D.—Arrangements are being made for the installation of municipal electric lighting system, estimated cost $15,000. Electric Development Company, 803 Frances Building, Sioux City, Ia., has charge of the engineering work.

DELL RAPIDS, S. D.—Northern States Power Company will erect a service line from Dell Rapids out about eight miles.

SOUTH CENTRAL STATES.

BENHAM, KY.—United States Coal & Coke Company is planning for the construction of an electric lighting plant.

FRANKFORT, KY.—Contract to construct the Frankfort-Shelbyville interurban line and the sureties to guarantee the right of way and depot site in Frankfort were signed by Construction Engineer P. C. Phillipp and the Frankfort & Shelbyville Realty Company. Work of construction is to begin not later than March 1, and to continue without interruption until the road is completed.

LOUISVILLE, KY.—Kentucky Utilities Company, with headquarters at Lexington, is erecting a transmission line to LaGrange, Ky., where it recently obtained the electric lighting franchise and will shortly be in a position to give continuous service. Offices have been taken by the company in the Peoples Bank Building.

MAGEE, MISS.—Mississippi State Tuberculosis Sanatorium is planning for the installation of an electric-lighting plant. B. Price, Empire Building, Birmingham, Ala., is architect.

EUFAULA, OKLA.—City has accepted plans prepared by J. L. Lowe, for the erection of a power plant at the river. Brick construction will be erected for the boiler, pumping room, etc. Bids will soon be advertised for.

BEAUMONT, TEX.—Eastern Traction Company is being organized for the purpose of constructing an interurban electric railway between Houston and Lake Charles, La. This proposed road will be about 160 miles long and will run through Beaumont, Orange and several smaller towns. The project is being promoted by Ed Kennedy of Houston and associates. Financial support in the way of liberal bonuses as well as donations of right of way and sites for terminals are being given in aid of the proposed road by the towns upon the route. Construction of the line will be started as soon as the necessary surveys have been made.

DALLAS, TEX.—Automatic and Southwestern Telephone Companies are merging into one.

WESTERN STATES.

TROY, MONT.—Kootenai Light & Power Company has signed contract to furnish all the power necessary to maintain and operate a light, heat and power plant here under a franchise granted by city council.

LOVELAND, COLO.—The municipal lighting proposition has again become active, through the action by city council in authorizing council's light committee to proceed with sale of bonds authorized at a special election held a year ago and the completion of lighting plant and distributing system. This step follows closely on refusal of Western Power & Light Company to sell its distributing system to the city on any terms short of a 10-year contract to furnish the city with all current required for maintenance of the system. The next step toward completion of plant will be the building of a pipe line, which is to carry water for the generation of power to a point above the plant. A dam has been constructed.

KINGMAN, ARIZ.—The ore-reduction and metal-extraction plant of Union Basin Mining Company, at Golconda, 20 miles from Kingman, was destroyed by fire Oct. 4. John D. Wanvig, manager, announces that plant will be rebuilt on a larger scale. The loss is estimated at $250,000, which is well covered by insurance.

SNOWFLAKE, ARIZ.—Snowflake & Taylor are having plans and specifications prepared for a hydroelectric plant which they will build here at a cost of about $50,000.

OGDEN, UTAH.—Automatic Controller & Manufacturing Company. Capital, $100,000. The company will manufacture electrical machinery. Cleveland Redfield is president; J. W. O'Brien, vice president; William Stone, secretary, and Thomas L. Whitehill, treasurer.

EVERETT, WASH.—A 30-month priority right on the waterpower of the Sauk-Suiattle River in Washington has been granted to the American Nitrogen Products Company, Securities Building, Seattle. It is proposed to erect the first unit of the nitrate plant at Darrington. Three units are contemplated at an estimated cost of $6,500,000.

GOLDENDALE, WASH.—Board of County Commissioners of Klickitat County has granted to the Pacific Power & Light Company a 50-year franchise to erect poles and wires for the transmission of electricity for all purposes along the county roads and streets in White Salmon and its vicinity.

SEATTLE, WASH.—The $390,000 in light extension bonds were sold to John E. Price & Company, at $366,873, interest at five per cent. The proceeds are to be used in paying for the city's new steam plant.

SEATTLE, WASH.—Following contracts have been placed for supplies for the city lighting department: Cable at $16,823 and copper pipe at 44 cents to Standard Underground Cable Company; potheads at $1231 to G. & W. Electric Company; instruments and control switches at $3085 and oil circuit breakers at $1515-$1840, General Electric Company; busbar at 39 cents a pound and circuit breakers at $3330, Burton R. Star; transformers at $1028, busbar supports and disconnecting switches at $7501, to W. R. Hendry & Company; feeder regulators at $6459 to Western Electric & Manufacturing Company; transformer bid of Western Electric & Manufacturing Company, $11,480; Allis-Chalmers Company, $11,500; Maloney Electric Company, $14,600; Packard Electric Company, $16,432, awarded to Allis-Chalmers Company on shorter delivery (four months). All individuals of companies receiving awards of contracts are either local concerns or concerns having branches here.

SPOKANE, WASH.—Washington Water Power Company will build a $200,000 power line into Coeur D'Alenes in Idaho, work to be started in the spring.

VANCOUVER, B. C., CANADA.—It is reported that the Grandy Consolidated Mining, Smelting & Power Company, Ltd., is to spend more than $1,000,000 in the purchase of coal lands in the Nanaimo district of British Columbia.

PORTLAND, ORE.—Sherman County Light & Power Company has incorporated.

BAKERSFIELD, CAL.—New addition to the Kern River Canyon plant has been completed. The new unit generates 3750 kilowatts, which added to old unit, makes a total output of 5150 kilowatts.

EUREKA, CAL.—Western Gas & Electric Company has ordered an electric transmission line laid from Eureka to the Rolph & Fay shipyards on Humboldt Bay.

LOS ANGELES, CAL.—Contract for the electrical power house and tunnel at the County Hospital has been awarded by the Board of Supervisors to Lee Callahan.

LOS ANGELES, CAL.—Southern California Division of the Pacific Telephone & Telegraph Company has authorized the expenditure of an additional $200,000 for improvements in its local service. Among the improvements which the present allotment of funds allows for are: About 6 miles of additional underground conduit system, the removal of pole lines from the city streets, and the improvement of the service throughout the city, while $500 is set aside for removing the lines which interfered with the construction of the proposed Second Street Tunnel.

PASADENA, CAL.—Plans are nearing completion for the purchase of the Pasadena distributing system of the Southern California Edison Company by the municipality and for the entering into an agreement for the purchase of power at wholesale rates from the company. The plan is for the city to pay for the company's system $500,715 cash at the end of a two years' lease and to purchase power from the company for 30 years at rates to be adjusted from time to time.

SAN DIEGO, CAL.—Board of Supervisors has awarded to the San Diego Consolidated Gas & Electric Company contracts for supplying current to the Imperial Beach, Normal Heights and Failbrook lighting districts.

SAN FRANCISCO, CAL.—Board of Supervisors unanimously adopted a resolution in favor of the acquisition of the United Railways and instructing the city engineer to begin at once the work of valuing the physical properties.

SAN FRANCISCO, CAL.—Pacific Gas & Electric Company has been authorized by railroad commission to sell for $13,000 its properties in Butte County, known as the Magalia Reservoir site, the Cherokee Ditch and a water right to Little Creek to the Paradise Irrigation District. The commission has also authorized the company to transfer to the Amador Electric Light & Power Company for $280 a 2400-volt transmission line from the Amador company's substation to the company's office in Sutter Creek, a quarter of a mile.

SAN FRANCISCO, CAL. — Railroad Commission has extended until Oct. 1, 1918, the time within which the San Diego Electric Railway Company may issue bonds hitherto authorized by the commission.

SANTA ANA, CAL.—Board of Supervisors has called an election to decide on the creation of the Placenta Lighting District.

SANTA ANA, CAL.—Board of trustees has granted the Pacific Electric Railway Company a 50-year franchise across the Irvine Division.

SANTA MONICA, CAL.—Sealed bids are being received for the installation of an ornamental electric lighting system on Colorado avenue, between Ocean avenue and the Promenade.

SAWTELLE, CAL.—Surveys have been made for improvements in the Pacific Electric Company's roadbed on Santa Monica Boulevard in Sawtelle to cost $130,000. New and heavier rails will be laid the entire distance, from the westerly to the easterly city limits and the roadbed will be given a heavy rock ballasting and paved with oil and macadam.

STOCKTON, CAL.—Western States Gas & Electric Company has filed an application with the State Water Commission, asking permission to appropriate 5000 acre-feet from Medley Lake and 7000 acre-feet from Echo Lake, both in ElDorado County, and 8000 acre-feet from Twin Lakes in Alpine County, for the purpose of developing 2500 horsepower at the existing hydroelectric plant of the American River Electric Company for a period of seven months in the year.

DATES AHEAD.

The Jovian Order. Annual convention, Hotel McAlpin, New York City, October 22-23. Mercury, Eli C. Bennett, Syndicate Trust Building, St. Louis, Mo.

Electrical Committee, National Fire Protection Association. Adjourned annual meeting, New York City, October 23-24, Secretary, Ralph Sweetland, 141 Milk Street, Boston, Mass.

National Electric Light Association, Southeastern Section. Annual convention, Birmingham, Ala., October 24 to 26. Secretary, T. W. Peters, Columbus, Ga.

Electrical Supply Jobbers' Association. Next meeting, Hotel Sinton, Cincinnati, Ohio, November 13-15. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago.

INCORPORATIONS

SELMA, ALA.—Selma Traction Company. Capital, $10,000. Incorporators: Hugh Mallory and others.

PHOENIX, ARIZ.—Ray Electric & Telephone Company has been incorporated here.

LOS ANGELES, CAL.—Renard-Stary Electric Company. Capital, $25,000. Incorporators: C. A. Renard, N. L. Stary and C. L. Chandler.

DOVER, DEL.—Frankfort & Shelbyville Electric Traction Company. Capital, $750,000. To operate street railways in Kentucky. Incorporators: M. L. Horty, F. D. Buck, and K. E. Longfield, Wilmington.

BROOKLYN, IA. — Brooklyn Mutual Telephone Company. Capital, $19,000. Incorporators: J. W. Frizzell, Walter Uhl and others.

ARROW CREEK, MONT.—Stanford Northern Telephone Company has incorporated here.

NEWARK, N. J.—Internal Combustion Company. Capital, $500,000. To manufacture motors. Incorporators: H. Y. Billings, Mountain Lakes, and D. and A. S. Henney, Montclair.

NEWARK, N. J.—Hydrade Machinery & Equipment Company. Capital, $100,000. To manufacture electrical equipment. Incorporators: Thomas J. Graves, Frederick A. Holt, and Harry A. Amerta, 22 North Eleventh Street.

SEATTLE, WASH.—Johnson Power Transmission Company has been incorporated here.

ELECTRIC SUPPLY COMPANY
MEMPHIS, TENN.
W. R. HERSTEIN, Secretary-Treasurer
REPRESENTING:
GENERAL ELECTRIC CO., PHILLIPS WIRE CO., HOTPOINT ELECTRIC HEATING CO., NATIONAL CARBON CO.,
And Other Leading Manufacturers—
ELECTRICAL JOBBERS EXCLUSIVELY
NO RETAILING :: :: NO CONTRACTING

PROPOSALS

ELECTRICAL SUPPLIES.—Bureau of Supplies and Accounts, Navy Department, Washington, D. C., will receive bids on the following equipment for delivery at yards mentioned: 9500 unglazed porcelain tubes, 25,000 solid covered arc-lamp carbons, Norfolk and Charleston, 20,900 solid and split porcelain knobs, Norfolk and Mare Island, schedule 1524, and the following under schedule 1525, single portable, direct-current, switchboard type ammeters, Norfolk and Charleston; back and front connected switch contact blocks and clips, Norfolk; cartridge type fuse blocks, Norfolk; soft and hard plate carbon, Philadelphia; contact ferrule fuse clips, Boston and Philadelphia; 245 double pole combination plug and switch cutouts; plug type inclosed fuses; 4-ampere glass tube fuses; link fuses; 21,000 nonwatertight portable guards; 5600 shade holders, various cities; 132 6 to 8-pound electric flatirons, Philadelphia; electric soldering irons, various cities; 126 white masthead lanterns, various cities; red and green running lanterns, various cities; 6 type C, white signal lanterns, Charleston, S. C.; 2050 pounds flexible plate mica, Boston and Norfolk; grades A and B pressed plate mica, various cities; 7500 yards oiled insulating muslin, Boston and Norfolk; 830 lead-acid type, storage battery testing outfits, Brooklyn, N. Y.; 750 pounds insulating fish paper, Boston and Norfolk; soldering paste, various cities; Edison base attachment plugs, various cities; 250 5-ampere hooded receptacles, Portsmouth and Charleston; 950 steel reflectors, Norfolk and Charleston; 1900 yards pigtail copper ribbon, Norfolk; 400 pounds spring copper ribbon, Norfolk; nickel chronium resistance ribbon, Norfolk and Charleston; 5000 illuminating set socket rings, Boston; hard rod rubber, various cities; asbestos cotton sleeving, various cities; incandescent lamp wall sockets, various cities; 25,400 lamp sockets, Brooklyn; saddle copper-covered insulated staples, various cities; back-connected knife switches, various cities; indicating snap switches, various cities; cambric insulating tape, Norfolk and Charleston; plain muslin insulating tape, various cities; 570 gross yards plain muslin insulating tape, Mare Island, Cal.; 1,300 rolls silk varnished tape, Norfolk; copper cable terminals, various cities; 64,000 2-hole terminals for 10-wire connection boxes, Brooklyn; 210 feet grade B pressed mica tubing, Mare Island; grade B pressed mica tubing, Boston and Philadelphia; rubber tubing, various cities.

Electrical Patents Issued October 9, 1917

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,242,132. Electric Clock. G. Blumberg and J. A. Butkus, Baltimore, Md. Details of solenoid operated mechanism.

1,242,144. Track Apparatus for Indicating the Movements of Railway Trains. T. E. Clark, Detroit, Mich. Block system wherein the wave length and frequency of oscillating currents passing to a way side circuit is controlled.

1,242,155. Phonograph and the Like. J. Hunter, Cranford, N. J., assignor to Aeolian Co. Has light circuit controlled by lid prop.

1,242,164. Semi-Automatic Telephone System. E. D. Fales, assignor to Automatic Electric Co., Chicago, Ill. Relates to grouping of lines and operators' positions.

1,242,166. Automatic Belt-Tensioning Means for Drive Mechanism. J. W. Fitz-Gerald, Detroit, Mich. Tension of generator driving belt is increased when magnetic load is increased.

1,242,171. Electric Welding. H. Geisenhoner, assignor to General Electric Co. Method of spot welding. [See cut.]

1,242,178. Circuit-Closing Means for Fire Alarms. H. W. Guthrie, Elmore, O. Structure of fuse controlled device.

1,242,185 and 1,242,186. Lamp. E. A. Hawthorne, Bridgeport, Conn. Headlight structures.

1,242,195. Circuit-Breaker. E. W. Johanson, Moline, Ill. Details of structure with solenoid controlled trigger.

1,242,196. Regulating Device for Wind-Motors. V. J. Johanson, Lidkoping, Sweden. Savomotor has pole charger in its circuit controlled by a speed governor.

1,242,204. Motor Attachment for Power-Driven Machines. A. Kimble, Glenellyn, Ill. Relates to the motor mounting. [See cut.]

1,242,209. Electric Heater. W. A. La Motte, Elizabeth, N. J. Manner of mounting electrodes in a liquid receptacle.

1,242,236. Treatment of Slurry. C. Pontoppidan, assignor to F. L. Smidth & Co., New York, N. Y. Slurry for use in the production of Portland cement has its fluidity increased and water content reduced by adding an electrolyte.

1,242,250. Electric-Furnace Control. J. A. Seede, assignor to General Electric Co. Special provision for controlling the reactance in the supply circuit.

1,242,258. Means for Starting Internal-Combustion Engines. P. Stern, New Orleans, La. Has electrically heated vaporizing arrangements for supplying priming fluid to intake manifold. [See cut.]

1,242,260. Limit Switch for Hoisting Machines. F. L. Stone, assignor to General Electric Co. Details of hoist driven mechanism operating limit switches.

1,242,267. Safety Device for Starting Mechanisms. B. P. Swyers, assignor to Motors Lock Co. of America, Pittsburgh, Pa. Combination switch.

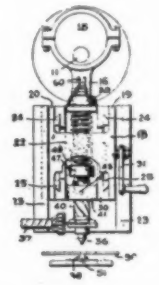
1,242,275. Electric Furnace. I. R. Valentine, assignor to General Electric Co. Structure of arc furnace.

1,242,284. Load-Regulating System. W. L. Waters, Milwaukee, Wis. Special arrangements for controlling fields of transformer units supplying consumption circuits to vary the voltage of said circuits.

1,242,312. Automatic Fire-Alarm System. W. N. Ballard, assignor one-fourth to J. S. Cummins, Kansas City, Kans. Circuit closer is closed if any of a net work of cables distributed in a building becomes slack.

1,242,326. Fuse Block. H. H. Curtis, assignor one-half to J. C. Phelps, Springfield, Mass. Arrangement and structure of branch circuit fuse blocks in a panel box.

1,242,328. Electric Train Lighting, Ventilating and Heating System and the Like. A. H. Darker, assignor to Stone & Co., Ltd., Deptford, England. Relates to grouping of lamps and resistance in a dynamo and battery system.



No. 1,242,171—Electric Welding.

1,242,333. Automatic Line-Closer for Series Electrical Circuits. B. S. Eddy, Elmira, N. Y. Structural details of a series line closer.

1,242,337. Electrical Distilling Apparatus. C. H. Fulton, assignor to Metallurgical Laboratories, Inc., Chicago, Ill. Structure of furnace arranged to pass current through the charge for distilling ores.

1,242,338. Telephone System. H. N. Faris, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Manual, common battery system.

1,242,339. Process for Distilling Metallic Ores. C. H. Fulton & T. M. Bains, assignors to Metallurgical Laboratories, Inc. Ore is treated in an electric furnace.

1,242,340. Apparatus for Distilling Metallic Ores and Metal-Bearing Materials. C. H. Fulton & T. M. Bains, Jr., assignors to Metallurgical Laboratories, Inc. Relates to structure of an electric furnace.

1,242,341. Electric Furnace. C. H. Fulton, assignor to Metallurgical Labor. Relates to electrode structure and composition for connecting together briquets to be treated.

1,242,349. Automatic Alarm. H. E. House, assignor to J. H. Safford, New York, N. Y. Structure of circuit closer held open by a displaceable weight.

1,242,357. Controlling Electrically Propelled Vessels. B. Ljungstrom, assignor to A. L. Angturbin, Stockholm, Sweden. Polyphase driving apparatus is controlled as to speed and direction of the ship by rocking a steering wheel.

1,242,367. Combined Spark Plug and Priming Device. A. Pache, New York, N. Y. Structural details.

1,242,372. Phonic Apparatus. C. S. Porter, Brooklyn, N. Y. Electrical contacting apparatus controlled by record operated stylus.

1,242,374. Automatic Trunking System. E. A. Reinke, assignor to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Auto manual system.

1,242,375. Spark-Plug. F. Robinson, Chicago, Ill. Structural details.

1,242,384. Automatic Telephone System. A. B. Sperry, assignor to Western Electric Co. An electrically operated switch having a circuit extending thereto comprising talking and non-talking conductors, the switch being controlled over the latter and test means being connected to the former.

1,242,417. Manufacture of Commutator Bars. J. Biggerstaff, assignor to Otis Elevator Co., Jersey City, N. J. The bars are slotted after assembly and coated with soldering flux while still bright.

1,242,442. Making Pig Iron. E. Humbert, Welland, Ontario, Canada. Employs an electric furnace.

1,242,449. Auto-Signal. J. P. Kasper, Hammond, Ind. Direction indicator.

1,242,457. Electric Circuit. M. H. Loughridge, Bogota, N. J. A power transmission system interrelated to railway track switches.

1,242,458. Automatic Party-Line Telephone System. F. Lubberger, assignor to Automatic Electric Co., Chicago, Ill. Relates to calling arrangements.

1,242,464. Electric Metallurgical Furnace and Method of Operating the Same. W. E. Moore, Pittsburgh, Pa. Arrangement of three phase furnace for steel manufacture.

1,242,470. Telegraph Key. J. G. Peterson & O. H. Huebel, assignor to Manhattan Electrical Supply Co., Jersey City, N. J. Details of Morse instrument.

1,242,472. Device for Measuring Electrical Energy. J. S. Piper, assignor to Otis Elevator Co., Jersey City, N. J. Arrangement of two meters for measuring the energy in a circuit where the current flow becomes reversed.

1,242,483. Work and Time Indicator. W. H. Shuster, Jr., and A. L. Grammer, Philadelphia, Pa. Arrangement and control of a set of electric adders.

1,242,493. Electrical Drink-Mixer. R. H. Stringham, Bountiful, Utah. Details of structure for rotating a rotor within a receptacle.

1,242,494. Lamp-Shade Bracket. H. L. Stubbs, Colorado Springs, Colo. For socket attachment.

1,242,497. Polyphase Reactance Coil. P. Torchio & H. R. Woodrow, assignors to T. E. Murray, New York, N. Y. Specific connections of coils of the "pancake" type.

1,242,498. X-Ray Apparatus. J. B. Wantz, assignor to Victor Electric Corp., Chicago, Ill. Manner of mounting and controlling the tube.

1,242,499. Thermoelectric Generator. H. W. Webb, Cresskill, N. J. Structural details of couple.

1,242,512. Coherer Protector. H. D. Betz, Kansas City, Mo. Details of casing for coherer with special provision for effecting connection with the terminals thereof.

1,242,513. Dynamo Suspension. W. F. Bouche, Depew, N. Y., assignor to Gould Coupler Co. For use on railway cars.

1,242,516. Direction Indicator. O. L.

Britton, El Paso, Tex. For automobiles. Details of device having an electrically actuated and illuminated pointer.

1,242,517. **Electric Coupling for Train-Line Circuits.** T. R. Brown, assignor to Westinghouse Air Brake Co., Wilmerding, Pa. Comprises fluid operated carriers for contacts connecting the terminals of counter part couplings.

1,242,524, 1,242,525 and 1,242,526. **Rail-Bonding Apparatus.** L. P. Crecelius, assignor to Electric Railway Improvement Co., Cleveland, Ohio. Various forms of devices adapted to be clamped to the rails without interfering with traffic for electrically brazing a bond to a rail.

1,242,527. **Method and Apparatus for Bonding Rails.** L. P. Crecelius, assignor to Electric Railway Improvement Co. Related to the above.

1,242,528. **Dynamo-Mounting.** G. Crosby, Glen Ridge, N. J., assignor to Gould Coupler Co. For suspending from car truck.

1,242,529. **Dynamo Suspension.** G. Crosby, assignor to Gould Coupler Co. Modification of the above.

1,242,547. **Burglar-Alarm.** S. H. Harrington, New York, N. Y. Opening of door or window turns on light, sets off an alarm clock and lifts telephone receiver from hook.

1,242,549. **Apparatus for Changing Direct Electric Currents into Interrupted Alternating Currents.** A. C. Heiny, New York, N. Y. Apparatus for interrupting and reversing direct current with high frequency.

1,242,552. **Automatic Fire Alarm.** M. F. Humphries, Morrin, Alberta, Canada. Details of temperature controlled circuit closer.

1,242,554. **Electrode Holder.** R. O. Jackson, assignor to Metallurgical Laboratories, Chicago, Ill. Details of a device with special cooling arrangements.

1,242,559. **Refrigerating Apparatus.** F. G. Keyes, Hoboken, N. J., assignor to National Automatic Refrigerator Co. Electromagnetically controlled.

1,242,575. **Signal Mechanism.** S. Milano, New York, N. Y. Thermostatic and gas detecting device.

1,242,580. **Apparatus for Electrically Making Cup-Shaped Projections in Metal Plates.** T. E. Murray, Jr., Brooklyn, N. Y. Relates to the electric heating of the plate operated upon.

1,242,581. **Method of and Apparatus for Electrically Making Openings in Metal Plates.** T. E. Murray, Jr., Brooklyn, N. Y. A portion of selected configuration is separated from a metal plate by electrically fusing a strip around it.

1,242,592. **Process of Producing Phenolic Condensation Compounds.** L. V. Redman, A. J. Weith and F. P. Brock, assignors to Redmanol Chemical Products Co., Chicago. Manner of making an insulating compound.

1,242,593. **Condensation Product and Method of Preparing Same.** L. V. Redman, A. J. Weith and F. P. Brock, assignors to Redmanol Chemical Products Co. Modification of above.

1,242,596. **Dynamo Mounting.** W. F. Richards, Buffalo, N. Y., assignor to Gould Coupler Co. For use on car trucks.

1,242,597. **Dynamo Suspension.** W. F. Richards, assignor to Gould Coupler Co. Modification of the above.

1,242,600. **Rectifier.** H. K. Sandell, assignor to H. S. Mills, Chicago, Ill. Commutating arrangement.

1,242,601. **Rectifier and the Motor Thereof.** H. K. Sandell, assignor to H. S. Mills, Chicago, Ill. Arrangement of alternating motor for driving rectifying commutator.

1,242,605. **Motion-Picture Apparatus.** E. Schneider, New York, N. Y. Has provision for removing static electricity from the film.

1,242,616. **Sectional High-Potential Insulator.** S. S. Sonneborn, Brooklyn, N. Y. Structure of lead-in bushing for transformers.

1,242,619. **Running-Switch for Electric Vehicles.** C. A. Ward, assignor to Ward Motor Vehicle Co., Mount Vernon, N. Y. Details of plug and socket structure.

1,242,625. **System of Signaling for Mine Hoists.** M. A. Whiting, assignor to General Electric Co. The signaling is interlocked with the setting of the hoist limit switches.

1,242,632. **System of Electrical Distribution.** E. F. W. Alexanderson, assignor to General Electric Co. Structure of generator and distributing system for high frequency polyphase currents.

1,242,637. **Electrical Connector.** C. C. Armstrong, Marysville, Ohio. Structure of plug and socket device.

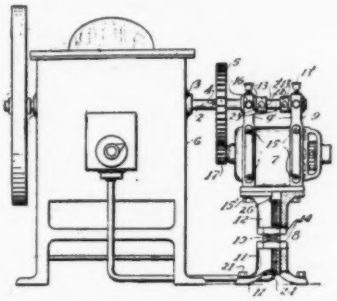
1,242,649. **Transformer-Winding.** F. F. Brand, assignor to General Electric Co. Manner of disposing windings and bringing out taps therefrom.

1,242,655. **Telephone-Exchange System.** H. P. Clausen, assignor to Western Electric Co. Has provision for associating a talking machine with a link circuit for requesting information from a calling subscriber.

1,242,656. **Electric Battery.** W. R. Clymer, Lakewood, Ohio, assignor to National Carbon Co. Relates to connections of superposed dry cells in a container.

1,242,665. **Automatic Train-Control Mechanism.** W. T. Ecroyd, Muncy, Pa. Throttle and brake valve are controlled from a track instrument.

1,242,672. **Telephone Equipment.** C. A. Finley, assignor to Western Electric Co. Structure and equipment of helmet.



No. 1,242,204—Motor Attachment for Power-Driven Machines.

1,242,687. **Electric Heater.** A. Harth, assignor to National Electric Utilities Corp., Danbury, Conn. Bowl shaped structure for radiating heat to the surface of percolator or other bowl to be heated contained therein.

1,242,695. **Method and Apparatus for Electroplating Wire Cloth.** R. O. Hood, assignor to Clinton Wire Cloth Co., Boston, Mass. Arrangement of anodes for circulating electrolyte.

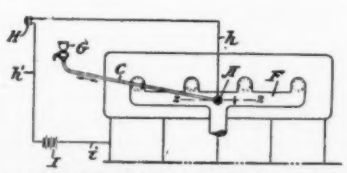
1,242,711. **Internal-Combustion Engine Water-Heater.** C. L. C. Magee, assignor one-third to H. F. Smith and one-third to G. R. Quin, Chicago, Ill. Tubular structure for insertion in an automobile radiator.

1,242,714. **Electromagnetic Power Transmitting and Converting Apparatus.** A. H. Neuland, San Francisco, Cal. Structure of dynamo-electric machine.

1,242,729. **Excess-Voltage Absorber.** F. Sieber, assignor to General Electric Co. A coil upon a core immersed in oil has a resistance also in the oil in shunt to end turns of the coil to dissipate energy generated in said turns by surges and the like.

1,242,730. **Attachment for Moving-Picture Machines.** H. Siegel, Elizabethport, N. J., assignor one half to L. Chasman, Newark, N. J. Contacts controlled by speed of film driving shaft control circuits of alarm and power circuits.

1,242,731. **Supporting and Locking Device.** F. Smith, Darby, Pa. For telephone receivers.



No. 1,242,258—Means for Starting Internal-Combustion Engines.

1,242,756. **Distance-Operated Mechanism and Signal Connected to Electric Supply Systems.** H. E. Angold, Eltham, and W. Duddell, A. H. Dykes and H. W. Handcock, London, and C. Oliver, Chislehurst, England. A local circuit is controlled by an electromagnetic oscillator controlled from a distance by current impulses.

1,242,763. **Electromagnet.** P. Bossu, assignor to Societe Anonyme des Etablissements L. Bleriot, Paris, France. The armature controls resistance whereby variation in magnetic reluctance for different positions of the armature.

1,242,776. **Apparatus for Forming Hard-Rubber Battery-Jars.** S. Curtis, assignor to E. E. Curtis, Trenton, N. J. Structural arrangement.

1,242,778. **Tooth-Nerve Tester.** A. R. Darling, assignor to Edwards Instrument Co., Indianapolis, Ind. Comprises a probe having a variable induction coil structure on the handle.

1,242,808. **Lamp Structure.** E. S. Hutton, Calgary, Alberta, Canada. Details of casing structure for head lights.

1,242,816. **Signaling Apparatus.** P. V. S. Koiff, assignor to Electric Tachometer Corp., Philadelphia, Pa. An indicator is arranged to indicate the functions of several generators individually or their average.

1,242,861. **Sign-Flasher.** C. D. Pruitt, Berkeley, Cal., assignor one-half to W. E. Joost, Alameda, Cal. Structural details of contact mechanism.

1,242,895. **Distributor.** J. F. Cavanagh, Meriden, Conn. Structure of device for ignition apparatus.

Patents Expired.

The following United States electrical patents expired on October 16, 1917:

659,655. Apparatus for the Electrolytic Decomposition of Alkaline Salts. E. Edser, London, England.

659,656. Testing Transformers, Etc. A. R. Everest, Lynn, Mass.

659,658. Electric Arc Lamp. R. Fleming, Lynn, Mass.

659,660. Apparatus for Periodical Generation of Electric Currents by Motors of Irregular Driving Power. M. Gehre, Rath, Germany.

659,664. System of Electrical Distribution. C. M. Green and J. G. Callan, Lynn, Mass.

659,687. Electric Incandescent Lamp. F. Myers, New York, N. Y.

659,691. Telephone Transmitter. G. B. Perkins, Medford, Mass.

659,694. High-potential Trolley System. W. B. Potter, Schenectady, N. Y.

659,697. Power-transmitting Mechanism. C. W. Richards and W. M. Chapman, Needham, Mass.

659,702. Means for Suspending Incandescent Electric Lights. T. Smith, Georgetown, Ill.

659,705. Clutch for Electric Arc Lamps. H. C. Spinney, Lynn, Mass.

659,711. Electric Arc Lamp. G. E. Stevens, Lynn, Mass.

659,716. Adjusting Reluctance of Magnetic Circuits. E. Thomson, Swampscott, Mass.

659,717. Contact Device. E. Thomson, Swampscott, Mass.

659,725. Electric Time Alarm. S. Wolf, Essen, Germany.

659,729. Control Apparatus for Electric Carriages. H. F. Eaton, Quincy, Mass.

659,759. Telephone-exchange System. J. L. McQuarrie, Chicago, Ill.

659,766. Automatic Electric Cut-out. J. H. Robertson, Morrison, Ill.

659,768. Pilot Signal for Telephone Switchboards. C. E. Scribner, Chicago, Ill.

659,789. Signal for Telephone Trunk Lines. H. M. Crane, New York, N. Y.

659,793. Electric Alarm System and Testing Apparatus. L. H. Des Isles, Cambridge, Mass.

659,824. Circuit Controller for Electrical Mechanism. W. A. McCallum, Cincinnati, O.

659,828. System of Electrical Distribution. E. W. Rice Jr., Schenectady, N. Y.

659,882. Spool for Electromagnets. G. L. Weaver, Boston, Mass.

659,891. Adjusting Device for Vacuum Tubes. T. B. Kinraide, Boston, Mass.

659,940. Telephone Switch. A. Stromberg, Chicago, Ill.

659,946. Electric Switch. G. H. Whittingham, Baltimore, Md.

659,958. Telephone System. W. M. Davis, Chicago, Ill.

659,959. Telephone-exchange System. W. M. Davis, Chicago, Ill.

660,006. Shutter Adapted for Use in Apparatus for Exhibiting or Viewing Animated Pictures. E. L. Doyen, Paris, France.

660,021. Electricity Meter. W. M. Mordey and G. C. Fricker, London, England.

660,043. Electrical Furnace. W. Borchers, Aachen, Germany.

660,045. Electrically Actuated Sawmill Set Works. W. M. Carroll, Beaumont, Texas.

660,047. Electric-lighting System. J. I. Conklin, New York, N. Y.

660,054. Controlling Brake for Motors. A. C. Eastwood, Ensley, Ala.

660,057. Astatic Armature for Electric-supply Meters. S. Evershed, London, England.

660,065. Traction System. F. J. Sprague, New York, N. Y.

660,066. Method of Regulating Motors. F. J. Sprague, New York, N. Y.

Financial News and Comment

Reports of Earnings.

BRAZILIAN TRACTION, LIGHT AND POWER COMPANY, LTD.

Combined earnings, in milreis, of subsidiaries:

	1917.	1916.
Aug. gross	8,064,000	7,405,000
Net earnings	4,017,000	4,053,000
Eight mos.' gross	60,505,000	56,013,000
Net earnings	32,268,000	31,215,000

These figures include earnings and expenses of telephone enterprise recently acquired, the operating results from which for the year 1916 were not brought into accounts until the end of the year.

DETROIT UNITED LINES.

	1917.	1916.
August gross	$1,544,248	$1,446,175
Net earnings	339,069	419,198
Total income	384,020	452,010
Surp. aft. tax & chgs.	182,280	254,218
Eight months' gross.	11,654,833	10,422,432
Net earnings	3,074,743	3,155,469
Total income	3,323,267	3,378,201
Surp. aft. tax & chgs.	1,734,235	1,840,859

WESTERN POWER OF CANADA, LTD.

	1917.	Change from 1916.
August gross	$ 37,376	Inc. 16.85%
Net earnings	25,827	Inc. 6.44%
Twelve mos.' gross	330,101	Inc. 31.37%

Net earnings for eight months of 1917 are $212,731, which compares with $161,419 for the same period of 1916.

SUBSIDIARIES OF GENERAL GAS & ELECTRIC CO.

Estimated gross revenue for month of September, 1916 and 1917, as follows:

	September— 1917.	1916.
Pa. Utilities Co.	$105,911.76	$83,351.36
Rutland System	42,233.70	40,274.84
Northw'tern O. Sys.	29,348.04	26,845.21
Sandusky System	34,669.09	27,802.37
Binghamton System.	30,015.24	25,580.35
Sayre System	8,278.50	7,586.55
New Jersey System.	18,379.85	16,456.33
Total	$268,836.18	$227,897.01

WESTERN UNION TELEGRAPH COMPANY.

The Western Union Telegraph Company reports a net income for the nine months ended Sept. 30 of $10,600,424, as compared with $9,409,803 for the corresponding period of last year. The complete report follows:

	1917.	1916.
Total revenue	$57,320,203	$45,789,770
Total expenses	45,720,893	35,381,080
Balance	11,599,311	10,408,690
Net income	10,600,424	9,409,803

CHICAGO TELEPHONE COMPANY.

The report of the Chicago Telephone Company, as submitted to the Interstate Commerce Commission for August, shows the operating revenue for the month amounted to $1,773,454, an increase of $143,308, as compared with the corresponding period of last year. Operating income was $206,688, an increase of $124,603. For the eight months ended Aug. 31, 1917, operating revenue totaled $14,322,425, an increase of $1,415,092, as compared with the same period last year. Operating income amounted to $2,502,530, a decrease of $433,804.

PACIFIC GAS & ELECTRIC COMPANY.

Income account of the Pacific Gas & Electric Co., for the fiscal year ended June 30, 1917, as filed with the New York Stock Exchange in connection with application for the listing of the company's general and refunding mortgage bonds, compares as follows:

	1917.	1916.
Gross operat. rev.	$19,084,424	$18,668,304
Exp., taxes, etc.	10,228,586	9,372,609
Depreciation	1,250,000	1,315,000
Net earnings	$7,605,838	$7,980,695
Miscel. income	516,775	466,480
Total income	$8,122,613	$8,447,175
Interest	3,936,264	3,846,794
Bond disc. and exp.	179,088	170,791
Balance	*$4,007,261	$4,429,589
Prefer'd dividends	1,431,851	1,260,060
Common dividends	1,710,816	1,820,306
Surplus	$864,594	$1,349,223
Miscel. additions	43,855	26,105
Total surplus	$908,449	$1,375,328
Reserve on account of rate litigation	337,328	378,381
Surplus	$571,121	$996,947

*Equivalent to $7.57 a share on $34,004,058 common stock, after dividends on the preferred stocks.

St. Paul Electrification Satisfactory.

Dow, Jones & Company, October 5, 1917, quoted Charles A. Goodnow, first assistant to the president of the Chicago, Milwaukee & St. Paul Railroad, and officer in charge of all the construction, as saying:

"It was unjustly and ignorantly stated in the financial columns of a New York newspaper that St. Paul was going on with its electrification, not because that method of operating had proved satisfactory or economical, but because we had gone so far that we could not stop.

"This may be flatly denied, like some other recent stories in the campaign against St. Paul's credit. Electrification has not only proved to be highly efficient, but economical and satisfactory in every way. It has solved the problem of reliance and cheap mountain operation, especially in the winter, and has demonstrated that the cost of repairs is only about one-half that of steam operation, while the capacity of the electric engines both as regards speed and tonnage, is practically double that of steam locomotives. Electric engines put in service in December, 1915, are still doing 100 per cent work and have never had a general overhauling."

Electric Railway Conference.

Members of the American Electric Railway Association held a conference recently in New York, to devise ways of increasing the revenue of this class of public utilities. L. S. Storrs, president of the association; E. G. Connette, president of the United Gas & Electric Corporation; Joseph K. Choate, vice president of the J. G. White Management Corporation, were among the speakers at this conference. A consensus of the statements made by them is that the cost of street car service has so advanced that the income of the transportation companies generally is insufficient to meet their needs and obligations; that hardly half of the companies are making their fixed charges, and that a few of them have fallen short of making operating expenses; that under existing conditions the new financing of electric street railways is possible only through bond issues. There was expressed a demand for an increase of fares. Some of the burdens of those corporations, which seem to make an increase of fares necessary, consist of paving assessments, franchise taxes and taxes on gross incomes. It was the belief of those in conference that the general public would prefer to have those assessments and special taxes removed, rather than to see the almost universal five-cent fare increased.

WEEKLY COMPARISONS OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Oct. 9.	Bid Oct. 16
Adirondack Electric Fower of Glens Falls, common	..	13	14
Adirondack Electric Power of Glens Falls, preferred	6	62	66
American Gas & Electric of New York, common	10+extra	103	100
American Gas & Electric of New York, preferred	6	45	44
American Light & Traction of New York, common	..	245	234
American Light & Traction of New York, preferred	6	101	100
American Power & Light of New York, common	4	60	58
American Power & Light of New York, preferred	6	82	76
American Public Utilities of Grand Rapids, common	..	28	25
American Public Utilities of Grand Rapids, preferred	6	60	59
American Telephone & Telegraph of New York	..	114	114
American Water Works & Elec. of New York, common	..	4½	4½
American Water Works & Elec. of New York, particip	7	11	12
American Water Works & Elec. of New York, first preferred	..	63	63
Appalachian Power of Bluefield, common	..	3	3
Appalachian Power of Bluefield, preferred	7	25	25
Cities Service of New York, common	+extra	222	215
Cities Service of New York, preferred	6	80¾	78¼
Commonwealth Edison of Chicago	8	117½	113
Comm. Power, Railway & Light of Jackson, common	4	43	43
Comm. Power, Railway & Light of Jackson, preferred	6	74	74
Federal Light & Traction of New York, common	..	10	8
Federal Light & Traction of New York, preferred	..	45	40
Illinois Northern Utilities of Dixon	6	75	75
Middle West Utilities of Chicago, common	2+2 extra	38	38
Middle West Utilities of Chicago, preferred	6	67	63
Northern States Power of Chicago, common	ex div. 7	74	71
Northern States Power of Chicago, preferred	ex div. 7	93	93
Pacific Gas & Electric of San Francisco, common	5	40½	39½
Pacific Gas & Electric of San Francisco, preferred	6	86	86
Public Service of Northern Illinois, Chicago, common	7	87	83
Public Service of Northern Illinois, Chicago, preferred	6	93	90
Republic Railway & Light of Youngstown, common	4	29	27
Republic Railway & Light of Youngstown, preferred	6	64	63
Standard Gas & Electric of Chicago, common	..	7	6½
Standard Gas & Electric of Chicago, preferred	6	29	29
Tennessee Railway, Light & Fower of Chattanooga, common	..	3½	3
Tennessee Railway, Light & Power of Chattanooga, preferred	6	23	22
United Light & Railways of Grand Rapids, common	4	33	35
United Light & Railways of Grand Rapids, preferred	6	67	65
Western Fower of San Francisco, common	..	11¾	10
Western Power of San Francisco, preferred	6	50	49
Western Union Telegraph of New York	extra	86	85¼
Industrials—			
Electric Storage of Philadelphia, common	4	55½	53½
General Electric of Schenectady	8	137	134¾
National Carbon of Cleveland, common	8	*76½	*68½
National Carbon of Cleveland, preferred	..	*130¾	*120¾
Westinghouse Electric & Mfg. of Pittsburgh, common	+extra	43¾	40¼
Westinghouse Electric & Mfg. of Pittsburgh, preferred	7	60	56

*Last sale.